



March 29, 2018

Ms. Claudia Smith
Federal Minor NSR Permit Coordinator
U.S. EPA, Region 8
1595 Wynkoop Street, 8P-AR
Denver, CO 80202-1129

FedEx #771474234579

Mr. Bruce Pargeets
Director, Energy & Minerals Department
Ute Indian Tribe
988 South 7500 East
Fort Duchesne, UT 84026

FedEx #771474303241

**Re: Revised Minor New Source Review Registration, FIP Part 2
Flat Rock Compressor Station (Registration UO-000996)
Uintah County, Utah**

Dear Ms. Smith & Mr. Pargeets,

The Flat Rock Compressor Station, a minor source oil and gas facility, is located on the Uintah & Ouray Indian Reservation in Uintah County, Utah, and is complying with the Federal Implementation Plan (FIP) for true minor sources in Indian Country. Tesoro Logistics (now known as Andeavor) submitted the FIP Part 1 registration for this facility (Registration UO-000996) to EPA on March 17, 2017. Andeavor, on behalf of Andeavor Field Services LLC, submitted the original Part 2 registration timely to EPA on December 1, 2017. To follow up discussions over the past few months with EPA, Andeavor is submitting the enclosed follow-up information confirming that the facility remains an area source for HAP emissions.

The enclosed registration includes the revised Part 2 form and all associated documentation in accordance with 40 CFR §49.160(c)(1)(iv). The updated information submitted today does not affect Andeavor's determination that it is a true minor source and qualifies for FIP.

At the time the original Part 2 registration was submitted, the site-specific gas analysis collected after startup indicated a HAP composition that was substantially different than the sample used to represent the facility for the preconstruction analysis and equipment design (there was no site-specific analysis available for the preconstruction design and emission calculations). Due to the unexpected composition change, Andeavor investigated why the composition was substantially different and embarked upon a multi-day gas sampling program. The results of the investigation concluded:

- Contrary to the specifications in Andeavor's contract with the primary upstream producer, the field gas was not being dehydrated by the producer upstream of the Flat Rock Compressor Station inlet, nor is it operationally feasible for the producer to do so due to low field pressures. This substantially affected the HAP content of the gas delivered to the inlet of the Flat Rock Compressor Station.

Andeavor also determined that a smaller glycol pump can be used; thus, the smaller pump was installed and has been in operation since December 5, 2017.

The revised results in this submittal present dehydrator emissions calculations (using the GLYCalc 4.0 emissions model) that are based on the consistent composition of the recent site-specific sampling program and the smaller glycol pump. The facility's PTE is less than 10 tons per year (tpy) for each individual HAP and less than 25 tpy for combined HAP emissions. Thus, the Flat Rock Compressor Station remains an area source for HAP emissions.

If you have any questions regarding this revised registration, please contact me at (303) 454-6685 or Thomas.H.Gibbons@andeavor.com.

Sincerely,



Thomas H. Gibbons
Environmental Specialist

Enclosure: Revised FIP Part 2 Registration Package

cc: Minnie Grant, Ute Indian Tribe (via email)



United States Environmental Protection Agency

<https://www.epa.gov/tribal-air/tribal-minor-new-source-review>

January 4, 2017

**Part 2: Submit Within 60 Days After Startup
 of Production -- Emission and Production
 Information**

**FEDERAL IMPLEMENTATION PLAN FOR TRUE MINOR SOURCES IN INDIAN
 COUNTRY IN THE OIL AND NATURAL GAS PRODUCTION AND NATURAL
 GAS PROCESSING SEGMENTS OF THE OIL AND NATURAL GAS SECTOR
 Registration for New True Minor Oil and Natural Gas Sources and Minor
 Modifications at Existing True Minor Oil and Natural Gas Sources**

Please submit information to:

[Reviewing Authority Address Phone]	U.S. EPA, Region 8 1595 Wynkoop Street, 8P-AR Denver, CO 80202-1129 (303) 312-6520
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A. GENERAL SOURCE INFORMATION (See Instructions Below)

1. Company Name Andeavor Field Services LLC		2. Source Name Flat Rock Compressor Station	
3. Type of Oil and Natural Gas Operation Natural Gas Compressor Station		4. New Minor Source? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
		5. True Source Modification? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
6. NAICS Code 211111		7. SIC Code 1311	
8. U.S. Well ID(s) or API Number(s) [if applicable] not applicable			
9. Area of Indian Country Uintah & Ouray Indian Reservation	10. County Uintah	11a. Latitude 39.55694	11b. Longitude -109.713189

B. CONTACT INFORMATION (See Instructions Below)

1. Owner Name Andeavor Field Services LLC		Title
Mailing Address 1801 California Street, Suite 1200; Denver, CO 80202		
Email Address		
Telephone Number (303) 454-6685	Facsimile Number N/A	
2. Operator Name (if different from owner)		Title
Mailing Address		
Email Address		
Telephone Number	Facsimile Number	
3. Source Contact Thomas Gibbons		Title Environmental Specialist
Mailing Address 1801 California Street, Suite 1200; Denver, CO 80202		
Email Address Thomas.H.Gibbons@andeavor.com		
Telephone Number (303) 454-6685	Facsimile Number N/A	

4. Compliance Contact		Title	
same as Source Contact			
Mailing Address			
Email Address			
Telephone Number		Facsimile Number	

C. EMISSIONS AND OTHER SOURCE INFORMATION

Include all of the following information in the table below and as attachments to this form:

Note: The emission estimates can be based upon actual test data or, in the absence of such data, upon procedures acceptable to the Reviewing Authority. The following procedures are generally acceptable for estimating emissions from air pollution sources: (1) unit-specific emission tests; (2) mass balance calculations; (3) published, verifiable emission factors that are applicable to the unit (i.e., manufacturer specifications); (4) other engineering calculations; or (5) other procedures to estimate emissions specifically approved by the Reviewing Authority. Guidance for estimating emissions can be found at <https://www.epa.gov/chief>.

- Narrative description of the operations.
- Identification and description of any air pollution control equipment and compliance monitoring devices or activities.
- Type and actual amount (annually) of each fuel that will be used.
- Type of raw materials used (e.g., water for hydraulic fracturing).
- Actual, annual production rates.
- Actual operating schedules.
- Any existing limitations on source operations affecting emissions or any work practice standards, where applicable, for all regulated New Source Review (NSR) pollutants at your source. Indicate all requirements referenced in the Federal Implementation Plan (FIP) for True Minor Sources in Indian Country in the Oil and Natural Gas Production and Natural Gas Processing Segments of the Oil and Natural Gas Sector that apply to emissions units and air pollution generating activities at the source or proposed. Include statements indicating each emissions unit that is an emissions unit potentially subject to the requirements referenced in the FIP, but does not meet the definition of an affected facility under the referenced requirement, and therefore, is not subject to those requirements.
- For each emissions unit comprising the new source or modification, estimates of the total allowable (potential to emit) annual emissions at startup of production from the air pollution source for the following air pollutants: particulate matter, PM₁₀, PM_{2.5}, sulfur oxides (), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H₂SO₄), hydrogen sulfide (H₂S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Allowable annual emissions are defined as: emissions rate of an emissions unit calculated using the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical

or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation, or the effect it would have on emissions, is legally and practically enforceable. You must determine the potential for emissions within 30 days from the startup of production.

- For each emissions unit comprising the new source or modification, estimates of the total actual annual emissions during the upcoming, consecutive 12 months from the air pollution source for the following air pollutants: particulate matter (PM, PM₁₀, PM_{2.5}), sulfur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, ammonia (NH₃), fluorides (gaseous and particulate), sulfuric acid mist (H₂SO₄), hydrogen sulfide (H₂S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Estimates of actual emissions must take into account equipment, operating conditions, and air pollution control measures. You should calculate an estimate of the actual annual emissions using estimated operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted.

D. TABLE OF ESTIMATED EMISSIONS

Provide in the table below estimates of the total allowable annual emissions in tons per year (tpy) and total actual annual emissions (tpy) for the following pollutants for all emissions units comprising the new source or modification.

POLLUTANT	TOTAL ALLOWABLE ANNUAL EMISSIONS (TPY)	TOTAL ACTUAL ANNUAL EMISSIONS (TPY)
PM	1.78	0.4
PM₁₀	1.78	0.4
PM_{2.5}	1.78	0.4
SO_x	0.05	0.01
NO_x	47.86	11.9
CO	74.47	18.6
VOC	30.45	7.6
Pb	0	0

POLLUTANT	TOTAL ALLOWABLE ANNUAL EMISSIONS (TPY)	TOTAL ACTUAL ANNUAL EMISSIONS (TPY)
NH3	0	0
Fluorides	0	0
H₂SO₄	0	0
H₂S	0	0
TRS	0	0

C. EMISSIONS AND OTHER SOURCE INFORMATION

Narrative Description of the Operations

A comingled liquid stream (containing natural gas, condensate, and produced water) flows from the field via pipeline to a separator on location. In the separator, the stream is separated into its individual phases (natural gas and liquids).

The natural gas phase exits the separator and is routed as follows:

The gas stream exits the separator and flows to compressors which compress the gas before entering the glycol dehydration unit. The compressors are driven by engines fueled with natural gas. Compressor engine Unit 6403 (C-200) is equipped with catalytic control to meet air emission standards.

Upon entering the glycol dehydration unit, the natural gas bubbles up through triethylene glycol (TEG) in a process vessel known as a contactor. During this process, water vapor is removed from the gas to a concentration determined by a sales contract. The pipeline quality natural gas then exits the contactor, is metered, and is routed to the sales line.

The TEG exits the contactor and is routed to a flash tank. Vapors from the flash tank are routed to the fuel gas system and combusted. The TEG exits the flash tank and is routed to a vessel known as a reboiler, where it is regenerated using heat. A small gas-fired heater heats the TEG to a set temperature that boils the impurities out of the TEG. The vapors from the regenerator are sent to a BTEX condenser; these vapors are then sent to a BTEX enclosed combustor. The reboiler is thermostatically controlled, and the burner for this unit is only in service when additional heat is required. The regenerated TEG is circulated back through the contactor.

The liquid phase exits the separator and is routed as follows:

The condensate flows to one of two 500-bbl condensate storage tanks on location. Once adequate volumes are accumulated, the condensate is loaded out and trucked off location to be sold.

The produced water from the liquids stream flows to one 300-bbl produced water storage tank on site. Once adequate volumes are accumulated, the produced water is loaded out and trucked off location for further processing or treatment.

Although not required by air quality regulations, a tank vapor enclosed combustor controls emissions from the storage tanks.

A small gas-fired line heater provides heat trace for the storage tanks and piping.

There are fugitive emissions associated with the potential seeping of gas from connections, seals, flanges, and valves. These emissions are not included for reporting purposes on EPA Form No. 5900-391 since emissions required by 40 CFR §49.160(c)(2)(iv) only include fugitives for certain categories (28 special categories among which this facility is not listed); thus, emissions from fugitive equipment leaks and miscellaneous venting were excluded.

Tank truck loading emissions also occur during the loading of the tank trucks for sales or treatment. The condensate and produced water are submerge-filled when loaded into the truck. As the condensate and produced water are pumped into the truck, the fluid displaces the vapors. The displacement causes the vapors to vent from inside the truck to the atmosphere.

Pneumatic pumps operate seasonally. Natural gas, which is used as the motive force for the pumps, is vented safely to atmosphere.

Pneumatic controllers are used throughout the year to control pressures and liquid levels in various pieces of equipment. The natural gas used as the motive force to operate these controllers is vented safely to the atmosphere.

Description of Air Pollution Control Equipment and Compliance Monitoring Devices or Activities

Emission units and air pollution generating activities at the facility include:

- Two natural gas-fired compressor engines, C-200 and C-201, with a total of 2465 hp; one unit (C-200) has catalytic emission controls (AFRC/NSCR)
- One 9.3-MMscfd TEG dehydrator unit equipped with a flash tank (recycled/recompressed, no emissions), BTEX condenser, and 24-inch Cimarron BTEX enclosed combustor (FL-900); note that the PTE assumes emissions are uncontrolled and does not account for emissions control from the BTEX condenser and BTEX combustor since the use of these control devices is not federally enforceable or required by rule.
- One 0.55-MMBtu/hr reboiler heater
- Three storage tanks: two 500-bbl (condensate), one 300-bbl (produced water); note that the PTE does not account for emissions control from the 48-inch tank vapor enclosed combustor (FL-600) since the use of this control device is not federally enforceable or required by rule.
- One 0.045-MMBtu/hr natural gas-fired line heater (for heat trace)
- Pneumatic pumps (natural gas-activated)
- Pneumatic controllers (natural gas-activated, intermittent bleed); the controller count has been updated for this submittal
- Fugitive emissions
- Storage tank loadout (condensate, produced water)

Air Pollution Control Equipment and Compliance Monitoring

The following is a description of air pollution control equipment and compliance monitoring devices or activities used at the facility:

- Compressor engine Unit 3146 (C-200) is subject to area source MACT Subpart ZZZZ remote engine requirements for maintenance practices (maintenance conducted by the leasing contractor).

- Compressor engine Unit 6403 (C-201) is equipped with catalytic emission controls and is subject to NSPS Subpart JJJJ requirements for periodic emissions testing; this unit follows the maintenance practices of the leasing contractor.
- Calendar quarter leak surveys are conducted for compliance with NSPS Subpart OOOOa, 40 CFR §60.5397a(g)(2).
- The TEG dehydrator is subject to the area source provisions of MACT, Subpart HH, for an area source not located in a UA plus offset and UC boundary, and will follow the applicable requirements for tracking the actual glycol pump rate such that it complies with the optimal circulation rate (L_{OPT}), per 40 CFR §63.764(d)(2)(ii).

Type and Actual Amount (Annually) of Each Fuel That Will Be Used

Natural gas fuel is used for all combustion equipment. The potential annual natural gas fuel consumption from all equipment is 198 MMscf. For 2017, the actual annual fuel consumption from all equipment is 49 MMscf.

Type of Raw Materials Used (e.g., water for hydraulic fracturing)

Not applicable.

Actual, Annual Production Rates

The potential annual throughput for the facility is 3394.5 MMscf. For 2017, the actual annual throughput is 846.3 MMscf (based on full-time operation of all equipment from October 2 through the December 31).

Actual Operating Schedules

Normal operation of the facility is 24 hours per day, 7 days per week.

Existing Limitations on Source Operations Affecting Emissions or Any Work Practice Standards

Any existing limitations on source operations affecting emissions or any work practice standards, where applicable, for all regulated New Source Review (NSR) pollutants at your source. Indicate all requirements referenced in the Federal Implementation Plan (FIP) for True Minor Sources in Indian Country in the Oil and Natural Gas Production and Natural Gas Processing Segments of the Oil and Natural Gas Sector that apply to emissions units and air pollution generating activities at the source or proposed. Include statements indicating each emissions unit that is an emissions unit potentially subject to the requirements referenced in the FIP, but does not meet the definition of an affected facility under the referenced requirement, and therefore, is not subject to those requirements.

The requirements of the Federal Implementation Plan (FIP) for Managing Air Emissions from True Minor Sources in Indian Country in the Oil and Natural Gas Production and Natural Gas Processing Segments of the Oil and Natural Gas Sector are enumerated in 40 CFR §49.105. The applicability of these FIP requirements is summarized below, and the table in Appendix A summarizes the requirements for emission units subject to these subparts.

(a) 40 CFR Part 63, Subpart DDDDD

For true minor sources (and minor modifications at true minor sources) that are subject to 40 CFR Part 63, Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters), sources must comply with all of the applicable provisions of the standard as written at the time the owner/operator begins construction on the new true minor source or on the minor modification at an existing true minor source.

The facility does not have any emission units subject to Subpart DDDDD and, therefore, is not subject to those requirements.

(b) 40 CFR Part 63, Subpart ZZZZ

For true minor sources (and minor modifications at true minor sources) that are subject to 40 CFR Part 63, Subpart ZZZZ (NESHAP for Stationary Reciprocating Internal Combustion Engines), for purposes of this FIP, sources must comply with all of the applicable provisions of the standard as written at the time the owner/operator begins construction on the new true minor source or on the minor modification at an existing true minor source.

The facility is a remote area source with two compressor engines subject to Subpart ZZZZ: Unit 6403 (“new” RICE) and Unit 3146 (“existing” RICE). As such, Andeavor will comply with all of the applicable provisions of the standard as written at the time of startup.

(c) 40 CFR Part 60, Subpart IIII

For true minor sources (and minor modifications at true minor sources) that are subject to 40 CFR Part 60, Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines), for purposes of this FIP, sources must comply with all of the applicable provisions of the standard as written at the time the owner/operator begins construction on the new true minor source or on the minor modification at an existing true minor source, except for paragraphs 40 CFR §49.105(c)(1) through (7).

The facility does not have any emission units subject to Subpart IIII and, therefore, is not subject to these requirements.

(d) 40 CFR Part 60, Subpart JJJJ

For true minor sources (and minor modifications at true minor sources) that are subject to 40 CFR Part 60, Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines), for purposes of this FIP, sources must comply with all of the applicable provisions of the standard as written at the time the owner/operator begins construction on the new true minor source or on the minor modification at an existing true minor source, except for paragraphs except for paragraphs §49.105(d)(1) through (5).

The facility has one compressor engine subject to Subpart JJJJ: Unit 6403. As such, the unit will comply with all of the applicable provisions of the standard as written at the time of startup.

(e) 40 CFR Part 60, Subpart Kb

For true minor sources (and minor modifications at true minor sources) that are subject to 40 CFR Part 60, Subpart Kb (Standards of Performance for Volatile Organic Liquid Storage Vessels), for purposes of this FIP, sources must comply with all of the applicable provisions of the standard as written at the time the owner/operator begins construction on the new true minor source or on the minor modification at an existing true minor source, except for paragraphs 40 CFR §49.105(e)(1) and (2).

The facility does not have any emission units subject to Subpart Kb and, therefore, is not subject to those requirements.

(f) 40 CFR Part 60, Subpart OOOOa

For true minor sources (and minor modifications at true minor sources) that are subject to 40 CFR Part 60, Subpart OOOOa (Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced after September 18, 2015), for purposes of this FIP, sources must comply with all of the applicable provisions of the standard as written at the time the owner/operator begins construction on the new true minor source or on the minor modification at an existing true minor source, except for paragraphs 40 §49.105(f)(1) through (5).

The facility has fugitive emissions subject to Subpart OOOOa. As such, the Andeavor will comply with all of the applicable provisions of the standard as written at the time of startup. The storage tank VOC emissions are less than 6 tpy per tank; thus, the tanks are not subject to Subpart OOOOa.

(g) 40 CFR Part 63, Subpart HH

For true minor sources (and minor modifications at true minor sources) that are subject to 40 CFR Part 63, Subpart HH (National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities), for purposes of this FIP, sources must comply with all of the applicable provisions of the standard as written at the time the owner/operator begins construction on the new true minor source or on the minor modification at an existing true minor source, except for paragraphs 40 CFR §49.105(g)(1) through (6).

As an area source, the facility has one emission unit subject to Subpart HH: the TEG dehydrator. As such, the unit will comply with all of the applicable provisions of the standard as written.

(h) 40 CFR Part 60, Subpart KKKK

For true minor sources (and minor modifications at true minor sources) that are subject to 40 CFR Part 60, Subpart KKKK (Standards of Performance for Stationary Combustion Turbines), for purposes of this FIP, the owner/operator must comply with all of the applicable provisions of the standard as written at the time the owner/operator begins construction on the new true minor source or on the minor modification at an existing true minor source.

The facility does not have any emission units subject to Subpart KKKK and, therefore, is not subject to those requirements.

Total Allowable (Potential to Emit) Annual Emissions at Startup of Production

For each emissions unit comprising the new source or modification, estimates of the total allowable (potential to emit) annual emissions at startup of production from the air pollution source for the following air pollutants: particulate matter, PM10, PM2.5, sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H2SO4), hydrogen sulfide (H2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Allowable annual emissions are defined as: emissions rate of an emissions unit calculated using the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation, or the effect it would have on emissions, is legally and practically enforceable. You must determine the potential for emissions within 30 days from the startup of production.

See Appendix A for total allowable (potential to emit) annual emissions. Note that the emissions required by 40 CFR §49.160(c)(2)(iv) only include fugitives for certain categories, among which this facility is not listed; thus, emissions from fugitive equipment leaks and miscellaneous venting can be excluded.

Total Actual Annual Emissions during the Upcoming, Consecutive 12 Months

For each emissions unit comprising the new source or modification, estimates of the total actual annual emissions during the upcoming, consecutive 12 months from the air pollution source for the following air pollutants: particulate matter (PM, PM10, PM2.5), sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, ammonia (NH3), fluorides (gaseous and particulate), sulfuric acid mist (H2SO4), hydrogen sulfide (H2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Estimates of actual emissions must take into account equipment, operating conditions, and air pollution control measures. You should calculate an estimate of the actual annual emissions using estimated operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted.

See Appendix A for actual annual emissions for 2017 based on actual operating conditions. Note that the emissions required by 40 CFR §49.160(c)(2)(iv) only include fugitives for certain categories, among which this facility is not listed; thus, emissions from fugitive equipment leaks and miscellaneous venting can be excluded.

Appendix A

Summary of Applicable Requirements and Regulatory Applicability Review

Summary of Applicable Requirements Contained in the Federal Rules Included in the Federal Implementation Plan for True Minor Sources in Indian Country in the Oil and Natural Gas Production and Natural Gas Processing Segments of the Oil and Natural Gas Sector

40 CFR Part and Subpart	Title of Subpart	Affected Sources	Types of Emission Standards	Types of Compliance Provisions (Monitoring, Recordkeeping and Reporting)
40 CFR Part 60, Subpart JJJ	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines	Spark Ignition Internal Combustion Engines (Compressor Engine: Unit 6403)	<u>Engines:</u> Meet standards for NO _x , CO and NMHC emissions in Table 1 to Subpart JJJ [40 CFR 60.4233(e)]	<u>Compliance:</u> Follow manufacturer's emission-related instructions, maintenance plan, performance tests [40 CFR 60.4243(b)(2)(ii)] <u>Recordkeeping and Reporting:</u> Records of maintenance, performance test results, notifications, certifications, documentation for engines not meeting standards (40 CFR 60.4245) <u>Testing:</u> Performance testing (40 CFR 60.4244)
40 CFR Part 60, Subpart OOOOa	Standards for New and Modified Sources in the Oil and Natural Gas Sector	Fugitive Emissions from Compressor Stations (Fugitive Equipment Leaks)	<u>Collection of Fugitive Emissions Components at a Compressor Station:</u> Reduce GHG and VOC emissions by complying with LDAR requirements [40 CFR 60.5397]	<u>Compliance</u> [40 CFR 60.5410(j)]: Achieve initial compliance by: <ul style="list-style-type: none"> • Developing a fugitive emissions monitoring plan • Conducting an initial (quarterly) monitoring survey • Maintaining the records for monitoring surveys • Repairing each identified leak • Submitting an initial annual report <u>Recordkeeping and Reporting</u> [40 CFR 60.5420]: Annual report that includes deviations, leak survey results; maintain records of deviations

Summary of Applicable Requirements Contained in the Federal Rules Included in the Federal Implementation Plan for True Minor Sources in Indian Country in the Oil and Natural Gas Production and Natural Gas Processing Segments of the Oil and Natural Gas Sector (continued)

40 CFR Part and Subpart	Title of Subpart	Affected Sources	Types of Emission Standards	Types of Compliance Provisions (Monitoring, Recordkeeping and Reporting)
40 CFR Part 63, Subpart HH	National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities	Glycol Dehydrators <i>(TEG dehydrator)</i>	Units Located at an Area Source of HAP Outside of an Urban Area: Minimize HAP emissions through work practice to maximize glycol circulation rate efficiency [40 CFR 63.764(j)]	<p><u>Applicability</u> [40 CFR 63.760(c)]:</p> <ul style="list-style-type: none"> If actual emissions are 5 tpy or more of a single HAP, or 12.5 tpy or more of a combination of HAPs, update the major source determination annually <p><u>Compliance</u> [40 CFR 63.764(d)(2)(ii)]:</p> <ul style="list-style-type: none"> Operate the TEG dehydration unit such that the actual glycol circulation rate does not exceed the optimum glycol circulation rate (L_{OPT}) <p><u>Reporting and Recordkeeping</u> [40 CFR 63.774(f), 63.775(c)]:</p> <ul style="list-style-type: none"> Initial Notification Records retention (calculation used to determine L_{OPT})
40 CFR Part 63, Subpart ZZZZ	Subpart ZZZZ— National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines	Reciprocating Internal Combustion Engines <i>(Compressor Engines: Unit 3146, Unit 6403)</i>	<p><u>Emission and Operating Limitations:</u> Owners/operators of existing stationary RICE located at an area source of HAP emissions must:</p> <ul style="list-style-type: none"> Meet work practices [40 CFR 63.6603(a)] Evaluate the status of their stationary RICE every 12 months for remote RICE [40 CFR 63.6603(f)] 	<p><u>General Compliance Requirements:</u> General requirements for complying (40 CFR 63.6605)</p> <p><u>Testing and Initial Compliance Requirements:</u> None for remote area sources</p> <p><u>Continuous Compliance Requirements:</u> How to demonstrate continuous compliance (40 CFR 63.6640):</p> <ul style="list-style-type: none"> Follow work practices listed in Table 2d <p><u>Records:</u> What records are required [40 CFR 63.6655(d) and (e)]:</p> <ul style="list-style-type: none"> Develop and follow maintenance plan (Table 6, Item 9) Records of maintenance <p><u>Notifications and Reports:</u> None for remote area sources</p>

Regulatory Applicability Review

This section provides a regulatory review of the federal air quality requirements applicable to the Flat Rock Compressor Station. The purpose of this section is to provide appropriate explanation and rationale regarding the applicability or non-applicability of these regulations to the facility.

40 CFR Part 71 – Operating Permit Requirements (Title V)

The federal operating permit program (Title V of the Federal Clean Air Act) is implemented by regulations codified at 40 CFR Part 71. The facility is a minor stationary source (“area source”) with respect to the Part 71 Operating Permit Program. The potential to emit (PTE), considering all federally enforceable controls, does not exceed the major source thresholds of 100 tpy for each criteria air pollutant and 10/25 tpy for individual/aggregated HAP emissions. Thus, the facility is not required to obtain Part 71 operating permit. With regard to the FIP’s exclusions of certain NSPS provisions [40 CFR §49.105(d)(2), 40 CFR §49.105(f)(2)], EPA confirmed (per a discussion on March 8, 2018 with EPA Region 8, Office of Federal Minor NSR Permit Coordinator) that it is not the FIP’s intent to require area sources subject to NSPS rules to obtain a Part 71 permit.

40 CFR Part 52 – Prevention of Significant Deterioration (PSD)

This facility is not a source listed in one of the 28 PSD source categories; therefore PSD requirements are triggered if the PTE exceeds 250 tpy of any criteria pollutant or 100,000 tpy of carbon dioxide equivalent (CO₂e). Based on these thresholds, this facility is a minor stationary source with respect to the Prevention of Significant Deterioration (PSD) Program.

40 CFR Part 49 – Federal Minor New Source Review Program in Indian Country

The Federal minor NSR program in Indian country applies in all Indian reservation lands where no EPA-approved program is in place and all other areas of Indian country where no EPA-approved program is in place and over which an Indian tribe, or the EPA, has demonstrated that a tribe has jurisdiction.

Under 40 CFR §49.151(c)(1)(iii) of this program, true minor sources (those sources with less than 250 tpy of any criteria pollutant) engaged in an oil and natural gas activity and that commence construction on or after October 3, 2016, must comply with the Federal Implementation Plan (FIP) for sources in the oil and natural gas production and natural gas processing segments of the oil and natural gas sector that are located in Indian country (§§49.101 through 49.105) or, alternatively, obtain a minor source permit pursuant to 40 CFR §§49.154 and 49.155 before beginning construction. All proposed new sources are also subject to the registration requirements of §49.160, and sources subject to the FIP under 40 CFR §§49.101 through 49.105 must comply with 40 CFR §49.160(c)(1)(iv). The FIP registration program has two parts:

- 1) Submit the Part 1 Registration Form 30 days prior to beginning construction, and
- 2) Submit the Part 2 Registration Form within 60 days after startup

The FIP Part 1 registration was submitted to EPA on March 17, 2017. Startup of the Flat Rock Compressor Station occurred on October 2, 2017; the original FIP Part 2 registration was timely submitted on December 1, 2017.

40 CFR Part 64 – Compliance Assurance Monitoring

Compliance Assurance Monitoring (CAM) requirements apply to a pollutant-specific emissions unit (PSEU) at a major source that is required to obtain a part 70 or 71 permit if the unit satisfies all of the following criteria:

- The unit is subject to an emission limitation or standard for the applicable regulated air pollutant (or a surrogate thereof);
- The unit uses a control device to achieve compliance with any such emission limitation or standard; and
- The unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

The TEG dehydrator's potential pre-control device emissions are not classified as a major source that is required to obtain a Part 70 or 71 permit. As such, this facility is not subject to CAM.

40 CFR Part 68 – Chemical Accident Prevention Provisions

The Chemical Accident Prevention rules under 40 CFR Part 68 require covered facilities to conduct a hazard assessment, develop a prevention program and an emergency response program, and submit a Risk Management Plan (RMP). Facilities must comply if they have "covered" processes involving regulated, highly hazardous substances in excess of specified threshold levels.

The facility does not have any regulated or highly hazardous substances in excess of specified threshold levels. As such, this facility is not subject to this subpart.

New Source Performance Standards (NSPS)

40 CFR Part 60 Subpart A - General Provisions: New Source Performance Standards (NSPS) Subpart A, General Provisions, applies to any stationary source that contains an affected facility to which a NSPS is applicable.

As discussed below, this facility is potentially subject to several NSPS; therefore, the requirements of Subpart A apply.

40 CFR Part 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units: NSPS Subpart Dc applies to steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989, and that have a maximum design heat input capacity less than 29 megawatts (MW) (100 MMBtu/hr) but greater than or equal to 2.9 MW (10 MMBtu/hr). 40 CFR 60.41c states:

“Steam generating unit means a device that combusts any fuel and produces steam or heats water or heats any heat transfer medium. This term includes any duct burner that combusts fuel and is part of a combined cycle system. This term does not include process heaters as defined in this subpart.”

The facility does not contain any heaters that have a maximum design heat input capacity of at least 10 MMBtu/hr; therefore, Subpart Dc does not apply.

40 CFR Part 60 Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984: Per 40 CFR 60.110b(d)(2) and (d)(4), this subpart does not apply to vessels with a design capacity less than or equal to 1,589.874 cubic meters (420,000 gal) used for petroleum or condensate stored, processed, or treated prior to custody transfer or pressure vessels designed to operate in excess of 204.9 kilopascal (kPa) and without emissions to the atmosphere.

The potentially subject atmospheric tanks at the facility each have a capacity of less than 1,589.874 m³; therefore, the storage tanks are exempt from this subpart.

40 CFR Part 60 Subpart KKK – Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants: This subpart applies to natural gas processing plants that commenced construction, reconstruction, or modification after January 20, 1984, and on or before August 23, 2011, and include the following facilities located at onshore natural gas processing plants: a compressor station, dehydration unit, underground storage tank, field gas gathering system, or liquefied natural gas unit. A natural gas processing plant is defined in Subpart KKK as “any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both.”

This facility does not engage in these operations; therefore, this subpart does not apply.

40 CFR Part 60 Subpart LLL – Standards of Performance for Onshore Natural Gas Processing: SO₂ Emissions: NSPS Subpart LLL applies to the following facilities that process natural gas: each sweetening unit, and each sweetening unit followed by a sulfur recovery unit.

The facility does not contain any sweetening units; therefore, Subpart LLL does not apply. The facility is a compressor station and not a natural gas processing plant; therefore, the facility is not subject to this subpart.

40 CFR Part 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines: This subpart applies to stationary spark ignition internal combustion engines that commenced construction, modification, or reconstruction after June 12, 2006.

The 1380-hp Waukesha L5794GSI compressor engine at the facility was manufactured on November 1, 2007, and is subject to this subpart, and will comply with the requirements applicable to this engine.

40 CFR Part 60 Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for which Construction, Modification or Reconstruction Commenced after August 23, 2011, and on or before September 18, 2015: This

subpart applies to “affected facilities” including but not limited to pneumatic controllers, storage vessels, reciprocating compressors, centrifugal compressors with wet seals, and components at onshore natural gas processing plants, which commenced construction, were modified, or were reconstructed after August 23, 2011, and on or before September 18, 2015.

All equipment at the facility was installed after September 18, 2015; therefore, the facility is not subject to this subpart. Also, the two reciprocating compressors (Ariel JGE-4 and Ariel JGT-4) were manufactured before August 23, 2011; therefore, the reciprocating compressors are not subject to this subpart.

40 CFR Part 60 Subpart OOOOa – Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 18, 2015: This subpart applies to “affected facilities” including but not limited to pneumatic controllers, pneumatic pumps, storage vessels, reciprocating compressors, centrifugal compressors with wet seals, and components at onshore natural gas processing plants and compressor stations, which commenced construction, were modified, or were reconstructed after September 18, 2015.

All equipment at the facility was installed after September 18, 2015, and the facility is a compressor station as defined in 40 CFR §60.5430a. Therefore, the collection of fugitive emissions components at the facility is subject to Subpart OOOOa and will comply with the applicable requirements.

Uncontrolled emissions from the storage tanks were estimated to be less than 6 tpy VOC per tank based on the first 30 days of operation per 40 CFR §60.5365a(e); therefore, storage vessels are not subject to this subpart.

The two reciprocating compressors (Ariel JGE-4 and Ariel JGT-4) were manufactured before August 23, 2011; therefore, reciprocating compressors are not subject to this subpart.

There are natural gas-activated pneumatic pumps at the facility; however, this is not a “well site” so pneumatic pumps are not subject to this subpart.

There are no high-bleed natural gas-activated pneumatic controllers at the facility; therefore, pneumatic controllers are not subject to this subpart.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

40 CFR Part 63 Subpart A – General Provisions: National Emission Standards for Hazardous Air Pollutants (NESHAPS) Subpart A, General Provisions, applies to any stationary source that contains an affected source to which a NESHAP is applicable.

As discussed below, this facility is subject to two NESHAPS; therefore, the requirements of Subpart A apply.

40 CFR Part 63 Subpart HH – National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities: This subpart applies to glycol dehydration units, storage vessels with the potential for flashing and throughput greater than 500 bbl/day, and fugitive equipment

at processing plants that are major sources of hazardous air pollutants (HAP) emissions, and triethylene glycol (TEG) dehydration units at area sources of HAP emissions.

The facility is not a natural gas processing plant. The facility does not have any storage vessels with a throughput greater than 500 bbl/day.

The TEG dehydrator at this facility is classified as an area source of HAP emissions and is not located in a UA plus offset and UC boundary. Since the PTE for the facility-wide combination of uncontrolled HAP emissions exceeds 12.5 tpy and toluene exceeds 5 tpy, the major source determination may need to be updated annually using gas composition data measured during the preceding 12 months if actual emissions exceed these thresholds, per required by 40 CFR §63.760(c).

The following requirements of 40 CFR §63.764(d) do apply to the TEG dehydrator:

- Determining the optimum glycol circulation rate, L_{OPT} (see L_{OPT} calculation in Appendix B),
- Tracking the actual glycol circulation rate, and
- Submitting an Initial Notification in accordance with the requirements in §63.775(c)(7)

The dehydration unit must also demonstrate on-going compliance with the following:

- Recordkeeping requirements in §63.774, and
- Reporting requirements in §63.775 [Periodic reports are not required, the only reporting required is the Initial Notification described at §63.775(c)(7). Per MACT HH, Table 2, area sources located outside UA plus offset and UC boundaries are not required to submit a Notifications of Compliance Status.]

40 CFR Part 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines: This subpart applies to stationary reciprocating internal combustion engines (RICE) at major and area sources of HAPs. The Unit 6403 compressor engine is a “new RICE” subject to Subpart ZZZZ and, based on its manufacture date of November 1, 2007, meets the requirements of this subpart by meeting the requirements of NSPS Subpart JJJJ, per 40 CFR §63.6590. The Unit 3146 compressor engine is an “existing RICE” subject to Subpart ZZZZ and, based on its manufacture date of January 27, 1993, is subject to the requirements of this subpart.

Appendix B

Emissions Summary and Calculations

**Flat Rock Compressor Station
General Facility Information**

Permit Number	Registration UO-000996
Owner	Name Andeavor Field Services LLC Address 1801 California Street, Suite 1200 Denver, CO 80202 Phone 303-454-6225
Responsible Official	Name Michael Gebhardt Phone 303-454-6620
Site Contact	Name Thomas Gibbons Phone 303-454-6685 Email Thomas.H.Gibbons@andeavor.com
Site Mailing Address	TBD
SIC	1311
Location Description	Uintah and Ouray Indian Reservation
Latitude/Longitude	39.55694, -109.713189
Legal Description	SE/NE Section 31, Township 14S, Range 20E Uintah County, Utah

**Flat Rock Compressor Station
Emissions Summary Sheet**

Potential Emissions (Uncontrolled)

Source	Potential Criteria Emissions (tpy)						Potential GHG (tpy)				Potential HAPs (tpy)												
	NO _x	CO	VOC	SO ₂	PM _{2.5}	PM ₁₀	CO ₂	CH ₄	N ₂ O	CO ₂ e	1,3-Butadiene	2,2,4-Trimethylpentane	Acetaldehyde	Acrolein	Benzene	Dichlorobenzene	Ethylbenzene	Formaldehyde	n-Hexane	Methanol	Toluene	Xylenes	HAP TOTALS
Unit 6403 Compressor Engine (Waukesha)	179.90	134.59	1.33	0.03	1.00	1.00	6641	0.13	0.01	6648	0.03	0.00	0.14	0.13	0.08	0.00	0.00	0.67	0.00	0.16	0.03	0.01	1.26
Unit 3146 Compressor Engine (Caterpillar)	20.95	20.95	3.25	0.02	0.77	0.77	5115	0	0	5120	0.01	0.00	0.33	0.20	0.02	0.00	0.00	2.72	0.04	0.10	0.02	0.01	3.45
9.3-MMscfd TEG Dehydrator	0.00	0.00	11.12	0.00	0.00	0.00	2.51	0.28	0.00	9.43	0.00	0.01	0.00	0.00	4.75	0.00	0.12	0.00	0.10	0.00	3.41	0.81	9.20
Dehydrator Glycol Reboiler	0.24	0.20	0.01	0.00	0.02	0.02	281.59	0.01	0.00	281.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heat Trace Line Heater	0.02	0.02	0.00	0.00	0.00	0.00	23.04	0.00	0.00	23.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500-bbl Condensate Tanks	0.00	0.00	1.92	0.00	0.00	0.00	0.30	1.85	0.00	46.46	0.00	0.01	0.00	0.00	0.09	0.00	0.00	0.00	0.08	0.00	0.09	0.04	0.31
300-bbl Produced Water Tank	0.00	0.00	0.48	0.00	0.00	0.00	0.03	0.17	0.00	4.38	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.02	0.01	0.08
Truck Loading	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitives - Equipment Leaks	0.00	0.00	5.64	0.00	0.00	0.00	1.49	24.32	0.00	609.51	0.00	0.02	0.00	0.00	0.11	0.00	0.05	0.00	0.09	0.00	0.31	0.44	1.02
Miscellaneous Venting ¹	0.00	0.00	5.46	0.00	0.00	0.00	4.76	77.96	0.00	1953.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	201.11	155.76	29.56	0.05	1.78	1.78	12069	105	0	14696	0.04	0.04	0.47	0.34	5.07	0.00	0.17	3.39	0.34	0.26	3.87	1.33	15.32

¹ Miscellaneous Venting emissions include those from Engine Startups, Compressor Blowdowns, Pneumatic Controllers, and Emergency Shutdowns.

Potential Emissions (Controlled)

Source	Potential Criteria Emissions (tpy)						Potential GHG (tpy)				Potential HAPs (tpy)												
	NO _x	CO	VOC	SO ₂	PM _{2.5}	PM ₁₀	CO ₂	CH ₄	N ₂ O	CO ₂ e	1,3 Butadiene	2,2,4-Trimethylpentane	Acetaldehyde	Acrolein	Benzene	Dichlorobenzene	Ethylbenzene	Formaldehyde	n-Hexane	Methanol	Toluene	Xylenes	HAP TOTALS
Unit 6403 Compressor Engine (Waukesha)	6.66	9.99	2.67	0.03	1.00	1.00	6641	0.13	0.01	6648	0.03	0.00	0.14	0.13	0.08	0.00	0.00	0.67	0.00	0.16	0.03	0.01	1.25
Unit 3146 Compressor Engine (Caterpillar)	20.95	20.95	3.25	0.02	0.77	0.77	5115	0	0	5120	0.01	0.00	0.33	0.20	0.02	0.00	0.00	2.72	0.04	0.10	0.02	0.01	3.45
9.3-MMscfd TEG Dehydrator	0.00	0.00	0.24	0.00	0.00	0.00	2.51	0.01	0.00	2.86	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.18
Dehydrator Glycol Reboiler	0.24	0.20	0.01	0.00	0.02	0.02	281.59	0.01	0.00	281.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heat Trace Line Heater	0.02	0.02	0.00	0.00	0.00	0.00	23.04	0.00	0.00	23.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500-bbl Condensate Tanks	0.00	0.00	0.10	0.00	0.00	0.00	0.30	0.09	0.00	2.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
300-bbl Produced Water Tank	0.00	0.00	0.48	0.00	0.00	0.00	0.03	0.17	0.00	4.38	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.02	0.01	0.08
Truck Loading	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitives-Equipment Leaks	0.00	0.00	5.64	0.00	0.00	0.00	1.49	24.32	0.00	609.51	0.00	0.02	0.00	0.00	0.11	0.00	0.05	0.00	0.09	0.00	0.31	0.44	1.02
Miscellaneous Venting ¹	0.00	0.00	5.46	0.00	0.00	0.00	4.76	77.96	0.00	1953.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	27.87	31.16	18.20	0.05	1.78	1.78	12069	103	0	14646	0.04	0.02	0.47	0.34	0.36	0.00	0.05	3.39	0.16	0.26	0.42	0.48	6.00

¹ Miscellaneous Venting emissions include those from Engine Startups, Compressor Blowdowns, Pneumatic Controllers, and Emergency Shutdowns.

**Flat Rock Compressor Station
Emissions Summary Sheet**

Potential Emissions (Allowable, Federally Enforceable) ¹

Source	Potential Criteria Emissions (tpy)						Potential GHG (tpy)				Potential HAPs (tpy)												
	NO _x	CO	VOC	SO ₂	PM _{2.5}	PM ₁₀	CO ₂	CH ₄	N ₂ O	CO ₂ e	1,3-Butadiene	2,2,4-Trimethylpentane	Acetaldehyde	Acrolein	Benzene	Dichlorobenzene	Ethylbenzene	Formaldehyde	n-Hexane	Methanol	Toluene	Xylenes	HAP TOTALS
Unit 6403 Compressor Engine (Waukesha)	26.65	53.30	13.33	0.03	1.00	1.00	6641	0.13	0.01	6648	0.03	0.00	0.14	0.13	0.08	0.00	0.00	0.67	0.00	0.16	0.03	0.01	1.26
Unit 3146 Compressor Engine (Caterpillar)	20.95	20.95	3.25	0.02	0.77	0.77	5115	0.10	0.01	5120	0.01	0.00	0.33	0.20	0.02	0.00	0.00	2.72	0.04	0.10	0.02	0.01	3.45
9.3-MMscfd TEG Dehydrator	0.00	0.00	11.12	0.00	0.00	0.00	2.51	0.28	0.00	9.43	0.00	0.01	0.00	0.00	4.75	0.00	0.12	0.00	0.10	0.00	3.41	0.81	9.20
Dehydrator Glycol Reboiler	0.24	0.20	0.01	0.00	0.02	0.02	281.59	0.01	0.00	281.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heat Trace Line Heater	0.02	0.02	0.00	0.00	0.00	0.00	23.04	0.00	0.00	23.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500-bbl Condensate Tanks	0.00	0.00	1.92	0.00	0.00	0.00	0.30	1.85	0.00	46.46	0.00	0.01	0.00	0.00	0.09	0.00	0.00	0.00	0.08	0.00	0.09	0.04	0.31
300-bbl Produced Water Tank	0.00	0.00	0.48	0.00	0.00	0.00	0.03	0.17	0.00	4.38	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.02	0.01	0.08
Truck Loading	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fugitives - Equipment Leaks ³	0.00	0.00	5.64	0.00	0.00	0.00	1.49	24.32	0.00	609.51	0.00	0.02	0.00	0.00	0.11	0.00	0.05	0.00	0.09	0.00	0.31	0.44	1.02
Miscellaneous Venting ^{2,3}	0.00	0.00	5.46	0.00	0.00	0.00	4.76	77.96	0.00	1953.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	47.86	74.47	41.56	0.05	1.78	1.78	12069	105	0	14696	0.04	0.04	0.47	0.34	5.07	0.00	0.17	3.39	0.34	0.26	3.87	1.33	15.32
TOTAL (without fugitives) ³	47.86	74.47	30.45	0.05	1.78	1.78	12063	3	0	12133	0.04	0.02	0.47	0.34	4.96	0.00	0.12	3.39	0.25	0.26	3.57	0.88	14.30

¹ Federally enforceable limits on NO_x, CO, and VOC under NSPS Subpart JJJJ for the compressor engine (Unit 6403).

² Miscellaneous Venting emissions include those from Engine Startups, Compressor Blowdowns, Pneumatic Controllers, and Emergency Shutdowns.

³ Emissions required by 40 CFR §49.160(c)(2)(iv) only include fugitives for certain categories (28 special categories among which this facility is not listed); thus, emissions from fugitive equipment leaks and miscellaneous venting can be excluded (but are included here for conservative calculations):

(iv) For each emissions unit that is listed, both the allowable and estimated actual annual emissions of each regulated NSR pollutant in tpy (including fugitive emissions, to the extent that they are quantifiable, if the emissions unit or source is in one of the source categories listed in §51, Appendix S, paragraph II.A.4(iii) or §52.21(b)(1)(iii) of this chapter), with supporting documentation.

Estimated Actuals (2017)

	Actual Criteria Emissions (tpy)					
	NO _x	CO	VOC	SO ₂	PM _{2.5}	PM ₁₀
Assumes 100% operation Startup (10/2) to 12/31, (without fugitives) :	11.9	18.6	7.6	0.0	0.4	0.4

Flat Rock Compressor Station
Engine Detail Sheet

Source ID Number	Unit 6403
Engine Usage	Compressor
Engine Make	Waukesha
Engine Model	L5794 GS:
Serial Number	C1730 1/1
Manufacture Date	11/1/2007
Startup Date	10/2/2017
Engine Configuration	4-Stroke Rich-Burn
Emission Controls	AFRCA/NSCR
Engine Regulation	NSPS JJJJ
Design Rating ¹	1380 BHP
Site Rating	1380 BHP
Fuel Heating Value ²	1039 Btu/scf (HHV)
Fuel Heating Value ²	937 Btu/scf (LHV)
Heat Rate	11.7 MMBtu/hr (HHV)
Engine Heat Rate (BSFC)	7667 Btu/hp-hr (LHV)
Engine Heat Rate (BSFC)	6481 Btu/hp-hr (HHV)
Potential Operation	hr/yr
Potential Fuel Usage (annual)	109.38 Mscf/yr
Potential Fuel Usage (daily)	300 Mscfd
Potential Fuel Usage (hourly)	12487 scf/hr

¹ Compressor engine design rating data taken from J.W Power Company pedigree (dated 5/7/2017).
² LHV and HHV are calculated from Flat Rock Discharge to FR Mesa Pipeline (Motor Number: 008042)

Potential Controlled Emissions

Pollutant	Emission Factor		Nominal Rating (hp)	Hrs of Operation (hr/yr)	Estimated Emissions		Source of Emission Factor	Global Warming Potential ⁴	Total Emissions CO ₂ e (tpy)
	(lb/MMBtu)	(g/hp-hr)			(lb/hr)	(tpy)			
NOx	1.30E-01	0.50	1380	8760	1.52	6.66	Manufacturer ¹		
CO	1.95E-01	0.75	1380	8760	2.28	9.99	Manufacturer ¹		
VOC/NMHC	5.20E-02	0.20	1380	8760	0.61	2.67	Manufacturer ¹		
SO ₂	5.88E-04	2.26E-03	1380	8760	0.01	0.03	AP-42 ²		
PM, PM ₁₀ , PM _{2.5}	1.94E-02	7.47E-02	1380	8760	0.23	1.00	AP-42 ²		
1,3-Butadiene	6.63E-04	2.55E-03	1380	8760	0.0078	0.0340	AP-42 ²		
Acetaldehyde	2.79E-03	1.07E-02	1380	8760	0.0327	0.1430	AP-42 ²		
Acrolein	2.63E-03	1.01E-02	1380	8760	0.0308	0.1348	AP-42 ²		
Benzene	1.58E-03	6.08E-03	1380	8760	0.0185	0.0810	AP-42 ²		
Ethylbenzene	7.44E-06	2.86E-05	1380	8760	0.0001	0.0004	AP-42 ²		
Formaldehyde	1.30E-02	0.05	1380	8760	0.1521	0.6663	Manufacturer ¹		
Methanol	3.08E-03	1.18E-02	1380	8760	0.0358	0.1569	AP-42 ²		
Toluene	5.58E-04	2.15E-03	1380	8760	0.0065	0.0286	AP-42 ²		
Xylene	1.95E-04	7.50E-04	1380	8760	0.0023	0.0100	AP-42 ²		
CO ₂	116.8891	4.50E+02	1380	8760	1516	6641	40 CFR 98 ³	1	6640.80
CH ₄	0.0022	8.48E-03	1380	8760	0.03	0.13	40 CFR 98 ³	25	3.13
N ₂ O	0.0002	8.48E-04	1380	8760	0.00	0.01	40 CFR 98 ³	310	3.88
Total CO₂e									6647.81

¹ Compressor engine design rating data taken from DGL International QUICK-LID Model DG75-12 catalytic converter, dated 10/22/2008 (NSCR added).
² EPA AP-42 (July 2000), Table 3.2-3, Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines (August 2000). PM includes both condensable and filterable PM. All PM is assumed to be PM_{2.5}, so PM = PM₁₀ = PM_{2.5}.
³ 40 CFR Part 98, Subpart C, Tables C-1 and C-2. (53.02 kg/MMBtu CO₂, 1x10³ kg/MMBtu CH₄, and 1x10⁴ kg/MMBtu N₂O).
⁴ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-year time horizon).

Potential Uncontrolled Emissions

Pollutant	Emission Factor		Nominal Rating (hp)	Hrs of Operation (hr/yr)	Estimated Emissions		Source of Emission Factor	Global Warming Potential ⁴	Total Emissions CO ₂ e (tpy)
	(lb/MMBtu)	(g/hp-hr)			(lb/hr)	(tpy)			
NOx	3.51E+00	13.50	1380	8760	41.07	179.90	Manufacturer ¹		
CO	2.63E+00	10.10	1380	8760	30.73	134.59	Manufacturer ¹		
VOC	2.60E-02	0.10	1380	8760	0.30	1.33	Manufacturer ¹		
SO ₂	5.88E-04	2.26E-03	1380	8760	0.01	0.03	AP-42 ²		
PM, PM ₁₀ , PM _{2.5}	1.94E-02	7.47E-02	1380	8760	0.23	1.00	AP-42 ²		
1,3-Butadiene	6.63E-04	2.55E-03	1380	8760	0.0078	0.0340	AP-42 ²		
Acetaldehyde	2.79E-03	1.07E-02	1380	8760	0.0327	0.1430	AP-42 ²		
Acrolein	2.63E-03	1.01E-02	1380	8760	0.0308	0.1348	AP-42 ²		
Benzene	1.58E-03	6.08E-03	1380	8760	0.0185	0.0810	AP-42 ²		
Ethylbenzene	2.48E-05	9.54E-05	1380	8760	0.0003	0.0013	AP-42 ²		
Formaldehyde	1.30E-02	0.05	1380	8760	0.15	0.67	Manufacturer ¹		
Methanol	3.08E-03	1.18E-02	1380	8760	0.0358	0.1569	AP-42 ²		
Toluene	5.58E-04	2.15E-03	1380	8760	0.0065	0.0286	AP-42 ²		
Xylene	1.95E-04	7.50E-04	1380	8760	0.0023	0.0100	AP-42 ²		
CO ₂	116.8891	4.50E+02	1380	8760	1568	6641	40 CFR 98 ³	1	6640.80
CH ₄	0.0022	8.48E-03	1380	8760	0.03	0.13	40 CFR 98 ³	25	3.13
N ₂ O	0.0002	8.48E-04	1380	8760	0.00	0.01	40 CFR 98 ³	310	3.88
Total									6647.81

¹ Compressor engine design rating data taken from GE data generated by EngCalc Program Version 3.4 Dresser Inc., dated 3/22/2017 (uncontrolled).
² EPA AP-42 (July 2000), Table 3.2-3, Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines (August 2000). PM includes both condensable and filterable PM. All PM is assumed to be PM_{2.5}, so PM = PM₁₀ = PM_{2.5}.
³ 40 CFR Part 98, Subpart C, Tables C-1 and C-2. (53.02 kg/MMBtu CO₂, 1x10³ kg/MMBtu CH₄, and 1x10⁴ kg/MMBtu N₂O).
⁴ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-year time horizon).

Potential Reserve Emissions

Pollutant	Emission Factor		Nominal Rating (hp)	Hrs of Operation (hr/yr)	Estimated Emissions		Source of Emission Factor	Global Warming Potential ⁴	Total Emissions CO ₂ e (tpy)
	(lb/MMBtu)	(g/hp-hr)			(lb/hr)	(tpy)			
NOx	5.20E-01	2.00	1380	8760	6.08	26.65	NSPS JJJJ ⁵		
CO	1.04E+00	4.00	1380	8760	12.17	53.30	NSPS JJJJ ⁵		
VOC/NMHC	2.60E-01	1.00	1380	8760	3.04	13.33	NSPS JJJJ ⁵		
SO ₂	5.88E-04	2.26E-03	1380	8760	0.01	0.03	AP-42 ¹⁰		
PM, PM ₁₀ , PM _{2.5}	1.94E-02	7.47E-02	1380	8760	0.23	1.00	AP-42 ¹⁰		
1,3-Butadiene	0.00E+00	0.00E+00	1380	8760	0.0000	0.0000	AP-42 ¹⁰		
Acetaldehyde	0.00E+00	0.00E+00	1380	8760	0.0000	0.0000	AP-42 ¹⁰		
Acrolein	0.00E+00	0.00E+00	1380	8760	0.0000	0.0000	AP-42 ¹⁰		
Benzene	0.00E+00	0.00E+00	1380	8760	0.0000	0.0000	AP-42 ¹⁰		
Ethylbenzene	0.00E+00	0.00E+00	1380	8760	0.0000	0.0000	AP-42 ¹⁰		
Formaldehyde	1.30E-02	0.05	1380	8760	0.1521	0.6663	Manufacturer ¹¹		
Methanol	0.00E+00	0.00E+00	1380	8760	0.0000	0.0000	AP-42 ¹⁰		
Toluene	0.00E+00	0.00E+00	1380	8760	0.0000	0.0000	AP-42 ¹⁰		
Xylene	0.00E+00	0.00E+00	1380	8760	0.0000	0.0000	AP-42 ¹⁰		
CO ₂	116.8891	4.50E+02	1380	8760	1516	6641	40 CFR 98 ¹²	1	6640.80
CH ₄	0.0022	8.48E-03	1380	8760	0.03	0.13	40 CFR 98 ¹²	25	3.13
N ₂ O	0.0002	8.48E-04	1380	8760	0.00	0.01	40 CFR 98 ¹²	310	3.88
Total CO₂e									6647.81

⁵ Compressor NSPS Subpart JJJJ, Table 1, for Non-Emergency SI Natural Gas engines < 500 hp, manufactured on or after 7/1/2007.
¹⁰ EPA AP-42 (July 2000), Table 3.2-3, Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines (August 2000). PM includes both condensable and filterable PM. All PM is assumed to be PM_{2.5}, so PM = PM₁₀ = PM_{2.5}.
¹¹ Compressor engine design rating data taken from GE data generated by EngCalc Program Version 3.4 Dresser Inc., dated 3/22/2017 (uncontrolled).
¹² 40 CFR Part 98, Subpart C, Tables C-1 and C-2. (53.02 kg/MMBtu CO₂, 1x10³ kg/MMBtu CH₄, and 1x10⁴ kg/MMBtu N₂O).
¹³ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-year time horizon).

Flat Rock Compressor Station
Engine Detail Sheet

Source ID Number	Unit 3146	
Engine Usage	Compressor	
Engine Make	Caterpillar	
Engine Model	G3516TAL6	
Serial Number	3RC00707	
Manufacture Date	1/27/1993	
Startup Date	10/20/2017	
Engine Configuration	4-Stroke Lean-Burn	
Emission Controls	None	
Engine Regulation	MACT ZZZZ (area source)	
Design Rating ¹	1095	BHP
Site Rating	1095	BHP
Fuel Heating Value ²	1039	Btu/scf (HHV)
Fuel Heating Value ²	937	Btu/scf (LHV)
Heat Rate	9.0	MMBtu/hr (HHV)
Engine Heat Rate (BSFC)	7497	Btu/hp-hr (LHV)
Engine Heat Rate (BSFC)	5309	Btu/hp-hr (HHV)
Potential Operation	8760	hr/yr
Potential Fuel Usage (annual)	84.25	MMScf/yr
Potential Fuel Usage (daily)	231	Mscfd
Potential Fuel Usage (hourly)	9617	scf/hr

¹ Compressor engine design rating data taken from J.W. Power Company pedigree (dated 8/30/2017).
² LHV and HHV are calculated from Flat Rock Discharge to FR Mesa Pipeline (Meter Number: 006042)

Potential Controlled Emissions

Pollutant	Emission Factor		Nominal Rating (hp)	Hrs of Operation (hr/yr)	Estimated Emissions		Source of Emission Factor	Global Warming Potential ⁸	Total Emissions CO ₂ e (tpy)
	(lb/MMBtu)	(g/hp-hr)			(lb/hr)	(tpy)			
NOx	5.31E-01	2.00	1095	8760	4.78	20.95	Manufacturer ⁵		
CO	5.31E-01	2.00	1095	8760	4.78	20.95	Manufacturer ⁵		
VOC/NMHC	8.23E-02	0.31	1095	8760	0.74	3.25	Manufacturer ⁵		
SO ₂	5.89E-04	2.22E-03	1095	8760	0.01	0.02	AP-42 ²		
PM ₁₀ , PM _{2.5}	1.94E-02	7.31E-02	1095	8760	0.17	0.77	AP-42 ²		
1,3-Butadiene	2.67E-04	1.01E-03	1095	8760	0.0024	0.0105	AP-42 ²		
Acetaldehyde	9.35E-03	3.15E-02	1095	8760	0.0754	0.3301	AP-42 ²		
Acrolein	5.14E-03	1.94E-02	1095	8760	0.0463	0.2029	AP-42 ²		
Benzene	4.40E-04	1.66E-03	1095	8760	0.0040	0.0174	AP-42 ²		
Ethylbenzene	1.19E-05	4.49E-05	1095	8760	0.0001	0.0005	AP-42 ²		
Formaldehyde	6.90E-02	0.26	1095	8760	0.6219	2.7240	Manufacturer ⁵		
Methanol	2.50E-03	9.42E-03	1095	8760	0.0225	0.9987	AP-42 ²		
Toluene	4.09E-04	1.54E-03	1095	8760	0.0037	0.0161	AP-42 ²		
Xylene	1.84E-04	6.93E-04	1095	8760	0.0017	0.0073	AP-42 ²		
PAH	2.69E-05	1.01E-04	1095	8760	0.0002	0.0011	AP-42 ²		
n-Hexane	1.11E-03	4.18E-03	1095	8760	0.0100	0.0438	AP-42 ²		
CO ₂	116.8991	4.40E+02	1095	8760	1168	5115	40 CFR 99 ³	1	5114.70
CH ₄	0.0022	8.31E-03	1095	8760	0.02	0.10	40 CFR 99 ³	25	2.41
N ₂ O	0.0002	8.31E-04	1095	8760	0.00	0.01	40 CFR 99 ³	310	2.99
Total CO₂e									5120.10

⁵ Compressor engine design rating data taken from Gas Engine Site Specific Technical Data, Gas Engine Rating Pro Version 6.04.00, dated 4/20/2017, Ref. Data Set DM0107-12-001, 4EK (uncontrolled).

² EPA AP-42 (July 2000), Table 3.2-2, Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines (August 2000). PM includes both condensable and filterable PM. All PM is assumed to be PM_{2.5}, so PM₁₀ = PM_{2.5}.

³ 40 CFR Part 98, Subpart C, Tables C-1 and C-2, (53.02 kg/MMBtu CO₂, 1x10⁻³ kg/MMBtu CH₄, and 1x10⁻⁴ kg/MMBtu N₂O).

⁸ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-year time horizon).

Potential Uncontrolled Emissions

Pollutant	Emission Factor		Nominal Rating (hp)	Hrs of Operation (hr/yr)	Estimated Emissions		Source of Emission Factor	Global Warming Potential ⁸	Total Emissions CO ₂ e (tpy)
	(lb/MMBtu)	(g/hp-hr)			(lb/hr)	(tpy)			
NOx	5.31E-01	2.00	1095	8760	4.78	20.95	Manufacturer ⁵		
CO	5.31E-01	2.00	1095	8760	4.78	20.95	Manufacturer ⁵		
VOC	8.23E-02	0.31	1095	8760	0.74	3.25	Manufacturer ⁵		
SO ₂	5.89E-04	2.22E-03	1095	8760	0.01	0.02	AP-42 ²		
PM ₁₀ , PM _{2.5}	1.94E-02	7.31E-02	1095	8760	0.17	0.77	AP-42 ²		
1,3-Butadiene	2.67E-04	1.01E-03	1095	8760	0.0024	0.0105	AP-42 ²		
Acetaldehyde	9.35E-03	3.15E-02	1095	8760	0.0754	0.3301	AP-42 ²		
Acrolein	5.14E-03	1.94E-02	1095	8760	0.0463	0.2029	AP-42 ²		
Benzene	4.40E-04	1.66E-03	1095	8760	0.0040	0.0174	AP-42 ²		
Ethylbenzene	3.97E-05	1.50E-04	1095	8760	0.0004	0.0016	AP-42 ²		
Formaldehyde	6.90E-02	0.26	1095	8760	0.6219	2.7240	Manufacturer ⁵		
Methanol	2.50E-03	9.42E-03	1095	8760	0.0225	0.9987	AP-42 ²		
Toluene	4.09E-04	1.54E-03	1095	8760	0.0037	0.0161	AP-42 ²		
Xylene	1.84E-04	6.93E-04	1095	8760	0.0017	0.0073	AP-42 ²		
PAH	2.69E-05	1.01E-04	1095	8760	0.0002	0.0011	AP-42 ²		
n-Hexane	1.11E-03	4.18E-03	1095	8760	0.0100	0.0438	AP-42 ²		
CO ₂	116.8991	4.18E-03	1095	8760	0.01	5115	40 CFR 99 ³	1	5114.70
CH ₄	0.0022	4.40E+02	1095	8760	1053.66	0.10	40 CFR 99 ³	25	2.41
N ₂ O	0.0002	8.31E-03	1095	8760	0.02	0.01	40 CFR 99 ³	310	2.99
Total									5120.10

⁵ Compressor engine design rating data taken from Gas Engine Site Specific Technical Data, Gas Engine Rating Pro Version 6.04.00, dated 4/20/2017, Ref. Data Set DM0107-12-001, 4EK (uncontrolled).

² EPA AP-42 (July 2000), Table 3.2-2, Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines (August 2000). PM includes both condensable and filterable PM. All PM is assumed to be PM_{2.5}, so PM₁₀ = PM_{2.5}.

³ 40 CFR Part 98, Subpart C, Tables C-1 and C-2, (53.02 kg/MMBtu CO₂, 1x10⁻³ kg/MMBtu CH₄, and 1x10⁻⁴ kg/MMBtu N₂O).

⁸ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-year time horizon).

Potential Feedstock Emissions

Pollutant	Emission Factor		Nominal Rating (hp)	Hrs of Operation (hr/yr)	Estimated Emissions		Source of Emission Factor	Global Warming Potential ⁸	Total Emissions CO ₂ e (tpy)
	(lb/MMBtu)	(g/hp-hr)			(lb/hr)	(tpy)			
NOx	5.31E-01	2.00	1095	8760	4.78	20.95	Manufacturer ⁵		
CO	5.31E-01	2.00	1095	8760	4.78	20.95	Manufacturer ⁵		
VOC/NMHC	5.31E-01	0.31	1095	8760	0.74	3.25	Manufacturer ⁵		
SO ₂	5.89E-04	2.22E-03	1095	8760	0.01	0.02	AP-42 ²		
PM ₁₀ , PM _{2.5}	1.94E-02	7.31E-02	1095	8760	0.17	0.77	AP-42 ²		
1,3-Butadiene	2.67E-04	1.01E-03	1095	8760	0.0024	0.0105	AP-42 ²		
Acetaldehyde	9.35E-03	3.15E-02	1095	8760	0.0754	0.3301	AP-42 ²		
Acrolein	5.14E-03	1.94E-02	1095	8760	0.0463	0.2029	AP-42 ²		
Benzene	4.40E-04	1.66E-03	1095	8760	0.0040	0.0174	AP-42 ²		
Ethylbenzene	3.97E-05	1.50E-04	1095	8760	0.0004	0.0016	AP-42 ²		
Formaldehyde	6.90E-02	0.26	1095	8760	0.6219	2.7240	Manufacturer ⁵		
Methanol	2.50E-03	9.42E-03	1095	8760	0.0225	0.9987	AP-42 ²		
Toluene	4.09E-04	1.54E-03	1095	8760	0.0037	0.0161	AP-42 ²		
Xylene	1.84E-04	6.93E-04	1095	8760	0.0017	0.0073	AP-42 ²		
PAH	2.69E-05	1.01E-04	1095	8760	0.0002	0.0011	AP-42 ²		
n-Hexane	1.11E-03	4.18E-03	1095	8760	0.0100	0.0438	AP-42 ²		
CO ₂	116.8991	4.40E+02	1095	8760	1053.66	5115	40 CFR 99 ³	1	5114.70
CH ₄	0.0022	8.31E-03	1095	8760	0.02	0.10	40 CFR 99 ³	25	2.41
N ₂ O	0.0002	8.31E-04	1095	8760	0.00	0.01	40 CFR 99 ³	310	2.99
Total CO₂e									5120.10

⁵ Compressor engine design rating data taken from Gas Engine Site Specific Technical Data, Gas Engine Rating Pro Version 6.04.00, dated 4/20/2017, Ref. Data Set DM0107-12-001, 4EK (uncontrolled).

² EPA AP-42 (July 2000), Table 3.2-2, Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines (August 2000). PM includes both condensable and filterable PM. All PM is assumed to be PM_{2.5}, so PM₁₀ = PM_{2.5}.

³ 40 CFR Part 98, Subpart C, Tables C-1 and C-2, (53.02 kg/MMBtu CO₂, 1x10⁻³ kg/MMBtu CH₄, and 1x10⁻⁴ kg/MMBtu N₂O).

⁸ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-Year Time Horizon).

Source ID Number	D-1
Source Description	TEG Dehy Regenerator and Flash Tank Vent
Startup Date	10/2/2017
Daily Throughput	9.3 MMscfd
Annual Throughput (potential)	3394.5 MMscf/yr
Annual Throughput (2017, actual)	635.346 MMscf/yr
Glycol Pump Type	Kimray 4020PV
Lean Glycol Pump Rate (max.)	0.67 gpm
Lean Glycol Pump Rate (L _{OPT})	0.56 gpm
Potential operation	8760 hr/yr
Flash Tank Off Gas Flow Rate	34.5 scf/hr
Regenerator Overhead Stream Flow Rate	265 scf/hr
Control (Flash Tank)	Yes <i>recycle/recompression control</i>
Control DRE (Flash Tank)	100%
BTEX Condenser	Yes
Control (Regenerator)	Yes <i>BTEX condenser, combustor (non-federally enforceable). Combustor startup 2/7/2018.</i>
Control DRE (Regenerator, combustor)	95.0%

Uncontrolled	Regenerator		Flash Tank		Total	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Propane	0.0434	0.19	0	0.00	0.04	0.19
Isobutane	0.0437	0.19	0	0.00	0.04	0.19
n-Butane	0.0452	0.20	0	0.00	0.05	0.20
Isopentane	0.0429	0.19	0	0.00	0.04	0.19
n-Pentane	0.0273	0.12	0	0.00	0.03	0.12
Cyclohexane	0.0398	0.17	0	0.00	0.04	0.17
Other Hexanes	0.0486	0.21	0	0.00	0.05	0.21
Heptanes	0.0727	0.32	0	0.00	0.07	0.32
Methycyclohexane	0.0507	0.22	0	0.00	0.05	0.22
C8+ Heavies	0.0226	0.10	0	0.00	0.02	0.10
Benzene	1.0844	4.75	0	0.00	1.08	4.75
Toluene	0.7792	3.41	0	0.00	0.78	3.41
Ethylbenzene	0.0265	0.12	0	0.00	0.03	0.12
Xylenes	0.1858	0.81	0	0.00	0.19	0.81
n-Hexane	0.0238	0.10	0	0.00	0.02	0.10
2,2,4-Trimethylpentane	0.0012	0.01	0	0.00	0.00	0.01
Total HAP	2.10	9.20	0.00	0.00	2.10	9.20
VOC	2.54	11.12	0.00	0.00	2.54	11.12
CO ₂	0.57	2.51	0.00	0.00	0.57	2.51
CH ₄	0.0632	0.28	0.00	0.00	0.06	0.28
CO ₂ e	2.15	9.43	0.00	0.00	2.15	9.43

Notes: Emissions calculated using actual operating parameters and GRI GLYCalc v 4.0;
CO₂e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1.

Controlled	Regenerator		Flash Tank		Total	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Propane	0.0021	0.01	0.00	0.00	0.00	0.01
Isobutane	0.0021	0.01	0.00	0.00	0.00	0.01
n-Butane	0.0021	0.01	0.00	0.00	0.00	0.01
Isopentane	0.0019	0.01	0.00	0.00	0.00	0.01
n-Pentane	0.0011	0.00	0.00	0.00	0.00	0.00
Cyclohexane	0.0012	0.01	0.00	0.00	0.00	0.01
Other Hexanes	0.0019	0.01	0.00	0.00	0.00	0.01
Heptanes	0.0016	0.01	0.00	0.00	0.00	0.01
Methycyclohexane	0.001	0.00	0.00	0.00	0.00	0.00
C8+ Heavies	0.0001	0.00	0.00	0.00	0.00	0.00
Benzene	0.0279	0.12	0.00	0.00	0.03	0.12
Toluene	0.0105	0.05	0.00	0.00	0.01	0.05
Ethylbenzene	0.0002	0.00	0.00	0.00	0.00	0.00
Xylenes	0.0008	0.00	0.00	0.00	0.00	0.00
n-Hexane	0.0008	0.00	0.00	0.00	0.00	0.00
2,2,4-Trimethylpentane	0.0001	0.00	0.00	0.00	0.00	0.00
Total HAP	0.04	0.18	0.00	0.00	0.04	0.18
VOC	0.06	0.24	0.00	0.00	0.06	0.24
CO ₂	0.57	2.51	0.00	0.00	0.57	2.51
CH ₄	0.0032	0.01	0.00	0.00	0.00	0.01
CO ₂ e	0.65	2.86	0.00	0.00	0.65	2.86

Notes: emissions calculated using actual operating parameters and GRI GLYCalc v 4.0;
CO₂e emissions reported per 40 CFR Part 98, 98.3(b)(4)(i) and Eq. A-1.

Flat Rock Compressor Station Dehydrator - Calculated Optimum TEG Flowrate

Factor of Safety	TEG-to-Water Ratio (gal TEG/lb H ₂ O)	F (MMSCF/D) ¹	I (lb/MMSCF) ²	O (lb/MMSCF)	L _{OPT} (gal/hr)	L _{OPT} (gpm)	Gallons per Stroke ³	Total Optimum Strokes Per Minute (spm)
1.15	3	9.30	32.27	7	33.8	0.56	0.0170	34

Calculated Optimum Flowrate [per 40 CFR § 63.764(d)(2)(i)]:

$$L_{opt} = 1.15 * 3.0 \frac{\text{gal TEG}}{\text{lb H}_2\text{O}} * \left(\frac{F * (I - O)}{24 \text{ hr/day}} \right)$$

L_{OPT} = Optimal circulation rate (gal/hr)

F = Gas flowrate (MMscf/day)

I = Inlet water content (lb/MMscf)

O = Outlet water content (lb/MMscf)

3.0 = The industry accepted rule of thumb for a TEG-to-water ratio (gal TEG/lb H₂O)

1.15 = Adjustment factor included for a margin of safety

Calculated gallons per stroke for the Kimray 4020PV pump³:

$$\frac{40 \text{ gal}}{\text{hr}} \quad \times \quad \frac{\text{hr}}{60 \text{ min}} \quad \times \quad \frac{\text{min}}{40 \text{ strokes}} \quad = \quad \frac{0.017 \text{ gal}}{\text{stroke}}$$

Notes:

¹Maximum design throughput of dehydrator.

²The inlet water content was calculated from GLYCalc (Calculated Wet Gas Water Content) using site-specific gas composition samples. Estimated annual average dehydrator inlet pressure and temperature were entered into GLYCalc.

³The gallons per stroke for the Kimray 4020PV pump are determined Kimray literature.

Abbreviations:

gal	gallons
gal/hr	gallons per hour
gal TEG/lb H ₂ O	gallons of triethylene glycol per pound of water
gpm	gallons per minute
H ₂ O	water
hr	hour
lb	pound
lb/hr	pounds per hour
lb/MMSCF	pounds per MMSCF
min	minutes
MMSCF	million standard cubic feet
MMSCF/D	million standard cubic feet per day
scf/hr	standard cubic feet per hour
TEG	triethylene glycol

Flat Rock Compressor Station
External Combustion Sources - Dehydrator Reboiler

Reboiler Heater

Emission Unit Number	H-300	
Equipment Usage	Reboiler	
Equipment Make	Natco	
Equipment Model	300-550	
Serial Number		
Startup Date	10/2/2017	
Emission Controls	None	
Fuel Heating Value	1039	Btu/scf
Mfr Heat Rate	0.55	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage (annual)	4.6	MMscf/yr
Potential Fuel Usage (daily)	13	Mscfd
Potential Fuel Usage (hourly)	529	scf/hr

Potential Emissions

Pollutant	Emission Factor (lb/MMscf)	Emission Factor (lb/MMBtu) ⁶	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor	Global Warming Potential ⁵	Total Emissions CO ₂ e
					(lb/hr)	(tpy)			
NOx	100.00	0.0980	0.55	8760	0.054	2.36E-01	AP-42 ¹		
CO	84.00	0.0824	0.55	8760	0.045	1.98E-01	AP-42 ¹		
VOC	5.50	0.0054	0.55	8760	0.003	1.30E-02	AP-42 ²		
SO ₂	0.60	0.0006	0.55	8760	0.000	1.42E-03	AP-42 ²		
PM, PM ₁₀ , PM _{2.5}	7.60	0.0075	0.55	8760	0.004	1.79E-02	AP-42 ²		
Benzene	2.10E-03	2.1E-06	0.55	8760	0.000	4.96E-06	AP-42 ³		
Dichlorobenzene	1.20E-03	1.2E-06	0.55	8760	0.000	2.83E-06	AP-42 ³		
Formaldehyde	7.50E-02	7.4E-05	0.55	8760	0.000	1.77E-04	AP-42 ³		
n-Hexane	1.80E+00	1.8E-03	0.55	8760	0.001	4.25E-03	AP-42 ³		
Toluene	3.40E-03	3.3E-06	0.55	8760	0.000	8.03E-06	AP-42 ³		
CO ₂		116.8891	0.55	8760	64.289	2.82E+02	40 CFR 98 ⁴	1	281.59
CH ₄		0.0022	0.55	8760	0.001	5.31E-03	40 CFR 98 ⁴	25	0.13
N ₂ O		0.0002	0.55	8760	0.000	5.31E-04	40 CFR 98 ⁴	310	0.16
Total CO₂e									281.88

¹ EPA AP-42, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion (July 1998).

² EPA AP-42, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion (July 1998). PM includes both condensable and filterable PM. All PM is assumed to be PM_{2.5}, so PM = PM₁₀ = PM_{2.5}.

³ EPA AP-42, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion (July 1998)

⁴ 40 CFR Part 98, Subpart C, Tables C-1 and C-2. (53.02 kg/MMBtu CO₂, 1x10⁻³ kg/MMBtu CH₄, and 1x10⁻⁴ kg/MMBtu N₂O)

⁵ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-Year Time Horizon).

⁶ All emission factors were converted to a lb/MMBtu basis by dividing by 1020 per footnote a of AP-42 Tables 1.4-1, 1.4-2, and 1.4-3.

Flat Rock Compressor Station
External Combustion Sources - Line Heater

Emission Unit Number	H-400	
Equipment Usage	Heat Trace Line Heater	
Equipment Make	N/A	
Equipment Model	N/A	
Serial Number	N/A	
Startup Date	2/10/2017	
Emission Controls	None	
Fuel Heating Value	1039	Btu/scf
Mfr Heat Rate	0.05	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage (annual)	0.4	MMscf/yr
Potential Fuel Usage (daily)	1	Mscfd
Potential Fuel Usage (hourly)	43	scf/hr

Potential Emissions

Pollutant	Emission Factor (lb/MMscf)	Emission Factor (lb/MMBtu) ⁶	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor	Global Warming Potential ⁵	Total Emissions CO ₂ e (tpy)
					(lb/hr)	(tpy)			
NOx	100.00	0.0980	0.05	8760	0.004	1.93E-02	AP-42 ¹		
CO	84.00	0.0824	0.05	8760	0.004	1.62E-02	AP-42 ¹		
VOC	5.50	0.0054	0.05	8760	0.000	1.06E-03	AP-42 ²		
SO ₂	0.60	0.0006	0.05	8760	0.000	1.16E-04	AP-42 ²		
PM, PM ₁₀ , PM _{2.5}	7.60	0.0075	0.05	8760	0.000	1.47E-03	AP-42 ²		
Benzene	2.10E-03	2.1E-06	0.05	8760	0.000	4.06E-07	AP-42 ³		
Dichlorobenzene	1.20E-03	1.2E-06	0.05	8760	0.000	2.32E-07	AP-42 ³		
Formaldehyde	7.50E-02	7.4E-05	0.05	8760	0.000	1.45E-05	AP-42 ³		
n-Hexane	1.80E+00	1.8E-03	0.05	8760	0.000	3.48E-04	AP-42 ³		
Toluene	3.40E-03	3.3E-06	0.05	8760	0.000	6.57E-07	AP-42 ³		
CO ₂		116.8891	0.05	8760	5.260	2.30E+01	40 CFR 98 ⁴	1	23.04
CH ₄		0.0022	0.05	8760	0.000	4.35E-04	40 CFR 98 ⁴	25	0.01
N ₂ O		0.0002	0.05	8760	0.000	4.35E-05	40 CFR 98 ⁴	310	0.01
Total CO₂e									23.06

¹ EPA AP-42, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion (July 1998).

² EPA AP-42, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

³ EPA AP-42, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion (July 1998)

⁴ 40 CFR Part 98, Subpart C, Tables C-1 and C-2. (53.02 kg/MMBtu CO₂, 1x10⁻³ kg/MMBtu CH₄, and 1x10⁻⁴ kg/MMBtu N₂O)

⁵ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-year time horizon).

⁶ All emission factors were converted to a lb/MMBtu basis by dividing by 1020 per footnote a of AP-42 Tables 1.4-1, 1.4-2, and 1.4-3.

**Flat Rock Compressor Station
Condensate Tank Detail Sheet**

Source ID Number	TK-310, TK-320	
Tank Usage	Condensate Storage	
Tank Contents	Condensate	
Tank Capacity, each (bbl)	500	
Serial Number	NA	
Manufacture Date	2007	
Startup Date	10/2/2017	
Emission Controls	Combustor	(non-federally enforceable)
Destruction Efficiency	95.0%	
Tank Orientation	Vertical	
Potential Operation (hr/yr)	8760	
Maximum Avg. Throughput (bbl/day) ¹	10.0	
Annual Throughput (bbl/yr)	3650	

¹ Based on the average daily liquids throughput determined for a 30-day period of production per §60.5365a(e).

Potential Emissions ¹

Component	Flashing Losses (tpy)	Working & Breathing Losses (tpy)	Total, uncontrolled (tpy)	Total, controlled (tpy)
CO2	0.199922	0.0968466	0.2968	0.2968
N2	0.00496628	0.000177631	0.0051	0.0051
Methane	1.58877	0.257866	1.8466	0.0923
Ethane	0.342293	0.270501	0.6128	0.0306
Propane	0.218157	0.140477	0.3586	0.0179
i-Butane	0.140819	0.0835975	0.2244	0.0112
n-Butane	0.109423	0.0650106	0.1744	0.0087
i-Pentane	0.115111	0.065636	0.1807	0.0090
n-Pentane	0.0572534	0.0324161	0.0897	0.0045
C6Alkanes(dibranched)	0.141758	0.0969112	0.2387	0.0119
n-Heptane	0.155484	0.0766077	0.2321	0.0116
n-Octane	0.0492219	0.0244056	0.0736	0.0037
n-Nonane	0.0247361	0.0116541	0.0364	0.0018
Benzene	0.0617945	0.0264109	0.0882	0.0044
Toluene	0.0604151	0.026782	0.0872	0.0044
Ethylbenzene	0.00325449	0.00150346	0.0048	0.0002
p-Xylene	0.0282646	0.0121039	0.0404	0.0020
n-Hexane	0.0513411	0.0284032	0.0797	0.0040
2,2,4-Trimethylpentane	0.00597169	0.00311192	0.0091	0.0005
C10+	1.76E-06	4.12E-07	2.17E-06	1.08E-07
VOC	1.22	0.70	1.92	0.10
HAPs	0.21	0.10	0.31	0.02
CO₂e	39.92	6.54	46.46	2.61

¹ Emissions calculated with ProMax 4.0.

Global Warming Potential ¹

CO2	1
CH4	25

¹ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-Year Time Horizon).

**Flat Rock Compressor Station
Produced Water Tank Detail Sheet**

Source ID Number	TK-330
Tank Usage	Produced Water Storage
Tank Contents	Produced Water
Tank Capacity, each (bbl)	300
Serial Number	NA
Manufacture Date	2004
Startup Date	10/2/2017
Emission Controls	None
Destruction Efficiency	0.0%
Tank Orientation	Vertical
Potential Operation (hr/yr)	8760
Maximum Avg. Throughput (bbl/day) ¹	1.0
Annual Throughput (bbl/yr)	365

¹ Based on the average daily liquids throughput determined for a 30-day period of production per §60.5365a(e).

Potential Emissions¹

Component	Flashing Losses (tpy)	Working & Breathing Losses (tpy)	Total (tpy)
CO2	0.0199922	0.0055009	0.0254931
N2	0.000496628	1.44E-05	0.000511008
Methane	0.158877	0.0154331	0.1743101
Ethane	0.0342293	0.0204069	0.0546362
Propane	0.0218157	0.048004	0.0698197
i-Butane	0.0140819	0.0472357	0.0613176
n-Butane	0.0109423	0.0367334	0.0476757
i-Pentane	0.0115111	0.0370868	0.0485979
n-Pentane	0.00572534	0.0183163	0.02404164
C6Alkanes(dibranched)	0.0141758	0.0547585	0.0689343
n-Heptane	0.0155484	0.0432862	0.0588346
n-Octane	0.00492219	0.0137901	0.01871229
n-Nonane	0.00247361	0.006585	0.00905861
Benzene	0.00617945	0.0149232	0.02110265
Toluene	0.00604151	0.0151328	0.02117431
Ethylbenzene	0.000325449	0.000849513	0.001174962
p-Xylene	0.00282646	0.00683913	0.00966559
n-Hexane	0.00513411	0.0160489	0.02118301
2,2,4-Trimethylpentane	0.000597169	0.00175835	0.002355519
C10+	1.76E-07	2.33E-07	4.08118E-07
VOC	0.12	3.6135E-01	0.48
HAPs	0.02	0.06	0.08
CO₂e	3.99	0.39	4.38

¹ Emissions calculated with ProMax 4.0.

Global Warming Potential¹

CO2	1
CH4	25

¹ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-Year Time Horizon).

**Flat Rock Compressor Station
Truck Loadout Detail Sheet**

Source ID Number	Truck Loadout	
Startup Date	10/2/2017	
Tank Contents	Condensate/Produced Water	
Emissions Control	None	
Potential Operation	8760	hr/yr
Throughput	11.0	bbl/day
Throughput	4015	bbl/yr
Throughput	168,600	gal/yr (rounded)

1

$$\text{Loading Loss (lb/1000 gal)} = (12.46 * S * P * M) / T$$

where:

- S = Saturation Factor = dedicated normal service
- P = True Vapor Pressure of liquid loaded (psia), from AP-42, Table 7.1-2
- M = Molecular Weight of Vapors, lb/lb-mole
- T = Temperature of bulk liquid loaded (°R)

Loading Loss = 4.12 lb/1000 gal

Potential Emissions

Pollutant	EPA S Factor ¹	True Vapor Pressure of Liquid Loaded (psia) ²	Mol. Wt. of Vapors (lb/lb-mol) ²	Temperature of Liquid (°F)	Temperature of Liquid (°R)	Sales Volume (bbl/yr)	Estimated Emissions		Source of Emission Factor
							VOC (lb/10 ³ gal)	VOC (tpy)	
VOC	0.6	4.2188	68	60	520	4015	4.12	0.35	AP-42

¹ EPA AP-42, Table 5.2-1, June 2008: S Factor for tank truck submerged loading: dedicated normal service.

² EPA AP-42, Table 7.1-2, November 2006, for Gasoline RVP 8.3 @ 60°F: True Vapor Pressure, PVA, and Vapor Molecular Weight, MV. True vapor pressure of liquid and molar weight of vapors based on engineering estimation of liquid RVP.

**Flat Rock Compressor Station
Fugitive Equipment Leaks**

Existing Fugitive Equipment Leaks TOC Emission Factors¹

Component	Service Category	Leak Rate without LDAR	
		kg/hr/component	lb/hr/component
Valves	Gas	4.50E-03	9.92E-03
	Heavy Oil	8.40E-06	1.85E-05
	Light Oil	2.50E-03	5.51E-03
	Water/Oil	9.80E-05	2.16E-04
Connectors	Gas	2.00E-04	4.41E-04
	Heavy Oil	7.50E-06	1.65E-05
	Light Oil	2.10E-04	4.63E-04
	Water/Oil	1.10E-04	2.43E-04
Flanges	Gas	3.90E-04	8.60E-04
	Heavy Oil	3.90E-07	8.60E-07
	Light Oil	1.10E-04	2.43E-04
	Water/Oil	2.90E-06	6.39E-06
Open-Ended Lines	Gas	2.00E-03	4.41E-03
	Heavy Oil	1.40E-04	3.09E-04
	Light Oil	1.40E-03	3.09E-03
	Water/Oil	2.50E-04	5.51E-04
Others	Gas	8.80E-03	1.94E-02
	Heavy Oil	3.20E-05	7.05E-05
	Light Oil	7.50E-03	1.65E-02
	Water/Oil	1.40E-02	3.09E-02
Pump Seals	Gas	2.40E-03	5.29E-03
	Heavy Oil	NA	NA
	Light Oil	1.30E-02	2.87E-02
	Water/Oil	2.40E-05	5.29E-05

¹ Emission Factors from Table 2-4, EPA-453/R-95-017, "Protocol for Equipment Leak Emission Estimates", November 1995)

Facility Fugitive Component Count Summary

Equipment	Light Oil ¹	Gas ¹	Water/Oil
Valves	70	340	0
Relief Valves	0	24	0
Connectors/Flanges	1043	2210	0
Compressors	0	2	0
OEL	0	0	0
Other ²	12	60	0
Pumps	5	0	4

¹ Component count from engineering estimate

² The "other" equipment type was derived from compressors, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents. This "other" equipment type should be applied for any equipment type other than connectors, flanges, open-ended lines, pumps, or valves.

Fugitive Equipment Leaks TOC Emissions (tpy)¹

Equipment	Light Oil	Gas	Water/Oil
Valves	1.69	14.77	0.00
Relief Valves	0.00	1.04	0.00
Connectors/Flanges	1.11	8.32	0.00
OEL	0.00	0.00	0.00
Other	0.87	5.10	0.00
Pumps	0.63	0.00	0.00
Total	4.29	29.24	0.00

¹ Emissions (tpy) = # components × EF lb TOC/component-hr × 1 ton/2000 lb × 365 day/hr

Fugitive Equipment Leaks VOC & HAP Emissions (tpy)

Pollutant	Light Oil Wt. % ¹	Gas Wt. % ²	Water/Oil Wt. %	(tpy)	Global Warming Potential ³	Total Emissions CO ₂ e (tpy)
VOC	100	4.61	100	5.64		
n-Hexane	1.3	0.10	0	0.09		
2,2,4-Trimethylpentane	0.4	0.01	0	0.02		
Benzene	2.0	0.09	0	0.11		
Toluene	6.8	0.04	0	0.31		
Ethylbenzene	1.1	0.00	0	0.05		
Xylenes	10.3	0.01	0	0.44		
CO ₂	0	5.08	0	1.5	1	1.49
CH ₄	0	83.18	0	24.3	25	608.03
Total CO₂e						609.51

¹ Light oil weight percent from inlet scrubber liquids composition

² Gas weight percent from dehydrator inlet gas composition

³ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-year time horizon).

Flat Rock Compressor Station
Vent Detail Sheet

Venting

Source ID Number	N/A
Source Description	Vented Emissions
Number of Startups	80 max/yr

Potential Venting Volumes - Blowdowns

Source Type	Equipment	No. of Units	Gas Emitted per Event (scf)	Events per Year	Annual Volume Emitted (scf)	Emission Factor Source
Engine Startups	Units 3146, 6403	2	1,653	80	264,480	Engineering Estimate ¹
Compressor Blowdowns	Units 3146, 6403	2	17,930	80	2,868,800	Engineering Estimate ¹
Emergency Shutdowns	Suction	2	N/A	0	0	Engineering Estimate ¹
Emergency Shutdowns	Discharge	2	N/A	0	0	Engineering Estimate ¹
SUBTOTAL					3,133,280	

Potential Venting Volumes - Controllers

Source Type	Equipment	No. of Units	Unit Flow Rate (scf/hr)	Hours per Year ²	Annual Volume Emitted (scf)	Emission Factor Source
Pneumatic Controllers	Level Controllers	16	6	8760	840,960	Mfr. Data / Engineering Estimate
SUBTOTAL					840,960	

Potential Venting Emissions

Pollutant	Gas Wt. %	Actual Mol.Wt. Gas (lb/mol)	Venting Emissions (tpy)				TOTAL	Global Warming Potential ³	Total Emissions CO ₂ e (tpy)
			Engine Startups	Compressor Blowdowns	Emergency Shutdowns	Pneumatic Controllers			
VOC	5.82	17.88	0.36	3.94	0.00	1.16	5.46		
n-Hexane	0.00	17.88	0.00	0.00	0.00	0.00	0.00		
2,2,4-Trimethylpentane	0.00	17.88	0.00	0.00	0.00	0.00	0.00		
Benzene	0.00	17.88	0.00	0.00	0.00	0.00	0.00		
Toluene	0.00	17.88	0.00	0.00	0.00	0.00	0.00		
Ethylbenzene	0.00	17.88	0.00	0.00	0.00	0.00	0.00		
Xylenes	0.00	17.88	0.00	0.00	0.00	0.00	0.00		
CO ₂	5.08	17.88	0.32	3.44	0.00	1.01	4.76	1	4.76
CH ₄	83.18	17.88	5.19	56.28	0.00	16.50	77.96	25	1949.09
TOTAL CO₂e									1953.85

¹ Engineering estimate from Operations.

² Assumes continuous venting throughout the year.

³ 40 CFR Part 98, Subpart A, Table A-1, Global Warming Potentials (100-year time horizon).

Flat Rock Compressor Station
Fuel Gas

Based on: Flat Rock Discharge To FR Mesa Pipeline (Meter Number: 008042)

Sample Date: 10/16/2017

Component	mole %	Mole Frac.	Component MW	Sample MW	VOC	HAPs	LHV		HHV	
							Btu/scf	Btu/scf*Mole Frac	Btu/scf	Btu/scf*Mole Frac
Water	0	0	18	0.0000				0		0
Nitrogen	1.0748	0.010748	28.0134	0.3011			0	0	0	0
Methane	92.6875	0.926875	16.043	14.8699			909.4	842.900125	1010	936.14375
Carbon Dioxide	2.0638	0.020638	44.01	0.9083			0	0	0	0
Ethane	2.5129	0.025129	30.07	0.7556			1618.7	40.6763123	1769.6	44.4682784
H2S (Max)	0	0	34.08	0.0000			586.8	0	637.1	0
Propane	0.6176	0.006176	44.097	0.2723	0.2723		2314.9	14.2968224	2516.1	15.5394336
i-Butane	0.3169	0.003169	58.123	0.1842	0.1842		3000.4	9.5082676	3251.9	10.3052711
N-Butane	0.1847	0.001847	58.123	0.1074	0.1074		3010.8	5.5609476	3262.3	6.0254681
I-Pentane	0.1473	0.001473	72.15	0.1063	0.1063		3699	5.448627	4000.9	5.8933257
N-Pentane	0.0676	0.000676	72.15	0.0488	0.0488		3706.9	2.5058644	4008.9	2.7100164
Other Hexanes	0.1251	0.001251	86.177	0.1078	0.1078		4392.7	5.4952677	4744.5	5.9353695
N-hexane		0	86.177	0.0000	0.0000	0.0000	4404.1	0	4750.2	0
Methylcyclopentane		0	84.1608	0.0000	0.0000		4392.7	0	4744.5	0
Benzene		0	78.114	0.0000	0.0000	0.0000	3591.1	0	3741.5	0
CycloHexane		0	84.1608	0.0000	0.0000		4179.9	0	4481.2	0
Heptane	0.1191	0.001191	100.204	0.1193	0.1193		5100.3	6.0744573	5500.4	6.5509764
Methylcyclohexane		0	98.18	0.0000	0.0000		4863.9	0	5215.7	0
Toluene		0	92.141	0.0000	0.0000	0.0000	4273.7	0	4474.5	0
2,2,4-Trimethylpentane		0	114.22	0.0000	0.0000	0.0000	5796.3	0	6249	0
Octanes	0.0777	0.000777	114.22	0.0887	0.0887		5796.3	4.5037251	6249	4.855473
Ethylbenzene		0	106.167	0.0000	0.0000	0.0000	4970.7	0	5221.7	0
Xylenes		0	106.167	0.0000	0.0000	0.0000	4957.4	0	5208.4	0
Nonanes	0.005	0.00005	128.25	0.0064	0.0064		6494	0.3247	6997	0.34985
NMHC	0	0	102.09	0	0.0000			0		0
Totals	100.00	1.00		17.88	1.04	0.00		937.30		1038.78

Weight Fraction of Vapors, VOC	0.058
Weight Fraction of Vapors, HAPs	0.0E+00
Weight Fraction of Vapors, Benzene	0.0E+00
Weight Fraction of Vapors, Toluene	0.0E+00
Weight Fraction of Vapors, Ethylbenzene	0.0E+00
Weight Fraction of Vapors, Xylenes	0.0E+00
Weight Fraction of Vapors, n-Hexane	0.0E+00
Weight Fraction of Vapors, 2,2,4-Trimethylpentane	0.0E+00
Spec. Gravity	0.6184

Flat Rock Compressor Station
Dehydrator Inlet Gas Analysis Summary

Based on: Composite Analysis from Flat Rock Dehydrator Inlet Gas
Sample Dates: December 6, 2017 - December 29, 2017

Component	mole %	Mole Frac.	Component MW	Sample MW	VOC	HAPs	LHV BTU CONTENT		HHV BTU CONTENT	
							Btu/scf	Btu/scf*Mole Frac	Btu/scf	Btu/scf*Mole Frac
Water	0.0000	0	18	0.0000				0		0
Nitrogen	1.00801	0.0100801	28.0134	0.2824			0	0	0	0
Methane	92.88264	0.9288264	16.043	14.9012			909.4	844.6747282	1010	938.114664
Carbon Dioxide	2.14469	0.0214469	44.01	0.9439			0	0	0	0
Ethane	2.53406	0.0253406	30.07	0.7620			1618.7	41.01882922	1769.6	44.84272576
H2S (Max)	0	0	34.08	0.0000			586.8	0	637.1	0
Propane	0.6466	0.006466	44.097	0.2851	0.2851		2314.9	14.9681434	2516.1	16.2691026
i-Butane	0.26366	0.0026366	58.123	0.1532	0.1532		3000.4	7.91085464	3251.9	8.57395954
N-Butane	0.17705	0.0017705	58.123	0.1029	0.1029		3010.8	5.3306214	3262.3	5.77590215
I-Pentane	0.1272	0.001272	72.15	0.0918	0.0918		3699	4.705128	4000.9	5.0891448
N-Pentane	0.05667	0.0005667	72.15	0.0409	0.0409		3706.9	2.10070023	4008.9	2.27184363
Other Hexanes	0.06144	0.0006144	86.177	0.0529	0.0529		4392.7	2.69887488	4744.5	2.9150208
N-Hexane	0.02147	0.0002147	86.177	0.0185	0.0185	0.0185	4404.1	0.94556027	4750.2	1.01986794
Methylcyclopentane	0	0	84.1608	0.0000	0.0000		4392.7	0	4744.5	0
Benzene	0.02041	0.0002041	78.114	0.0159	0.0159	0.0159	3591.1	0.73294351	3741.5	0.76364015
CycloHexane	0.00716	0.0000716	84.1608	0.0060	0.0060		4179.9	0.29928084	4481.2	0.32085392
Heptane	0.0285	0.000285	100.204	0.0286	0.0286		5100.3	1.4535855	5500.4	1.567614
Methylcyclohexane	0.00727	0.0000727	98.18	0.0071	0.0071		4863.9	0.35360553	5215.7	0.37918139
Toluene	0.0084	0.000084	92.141	0.0077	0.0077	0.0077	4273.7	0.3589908	4474.5	0.375858
2,2,4-Trimethylpentane	0.00112	0.0000112	114.22	0.0013	0.0013	0.0013	5796.3	0.06491856	6249	0.0699888
Octanes	0.00252	0.0000252	114.22	0.0029	0.0029		5796.3	0.14606676	6249	0.1574748
Ethylbenzene	0.00018	0.0000018	106.167	0.0002	0.0002	0.0002	4970.7	0.00894726	5221.7	0.00939906
Xylenes	0.00095	0.0000095	106.167	0.0010	0.0010	0.0010	4957.4	0.0470953	5208.4	0.0494798
Nonanes	0	0	128.25	0.0000	0.0000		6494	0	6997	0
NMHC	0	0	102.09	0	0.0000			0	0	0
Totals	100.0	1.00		17.71	0.82	0.04		927.82		1028.57

Weight Fraction of Vapors, VOC	0.0461
Weight Fraction of Vapors, HAPs	0.0025
Weight Fraction of Vapors, Benzene	9.0E-04
Weight Fraction of Vapors, Toluene	4.4E-04
Weight Fraction of Vapors, Ethylbenzene	1.1E-05
Weight Fraction of Vapors, Xylenes	5.7E-05
Weight Fraction of Vapors, n-Hexane	1.0E-03
Weight Fraction of Vapors, 2,2,4-Trimethylpentane	7.2E-05

Flat Rock Compressor Station
Flat Rock Extended Gas Analyses - Dehydrator Inlet

Date Sampled:	12/6/2017	12/7/2017	12/8/2017	12/11/2017	12/12/2017	12/13/2017	12/14/2017	12/22/2017	12/27/2017	12/29/2017	Avg. 12/6 - 12/29
Composition (mol%):											
Carbon Dioxide	2.205	2.0961	2.1751	2.1395	2.044	2.1666	2.1363	2.1714	2.179	2.1339	2.1447
Hydrogen Sulfide	ND	0									
Nitrogen	0.9851	0.9415	0.9639	0.9343	1.4353	0.966	1.0246	0.9312	0.9574	0.9408	1.0080
Methane	92.7514	92.9303	92.843	92.929	92.6082	92.9261	92.9107	92.9011	92.9923	93.0343	92.8826
Ethane	2.5537	2.5619	2.5688	2.5716	2.5127	2.5358	2.5269	2.5412	2.4851	2.4829	2.5341
Propane	0.6731	0.6649	0.6611	0.6618	0.6353	0.6372	0.639	0.6555	0.6158	0.6223	0.6466
Isobutane	0.2785	0.2615	0.2684	0.2618	0.2603	0.2607	0.2633	0.2681	0.2573	0.2567	0.2637
n-Butane	0.1929	0.1798	0.1801	0.1787	0.1753	0.1732	0.1755	0.1793	0.1668	0.1689	0.1771
Isopentane	0.1366	0.1327	0.129	0.1243	0.122	0.1249	0.1264	0.1288	0.1226	0.1247	0.1272
n-Pentane	0.0629	0.0612	0.0573	0.0554	0.0543	0.0551	0.0553	0.0565	0.0537	0.055	0.0567
Cyclopentane	0	0	0	0	0	0	0	0	0	0	0.0000
n-Hexane	0.0223	0.0237	0.0214	0.02	0.0203	0.0208	0.0201	0.0218	0.0216	0.0227	0.0215
Cyclohexane	0.0067	0.0079	0.007	0.0061	0.0069	0.0068	0.0061	0.0079	0.008	0.0082	0.0072
Other Hexanes	0.064	0.0672	0.0618	0.0579	0.0578	0.0602	0.0589	0.0616	0.0611	0.0639	0.0614
Heptanes	0.0275	0.0309	0.0274	0.025	0.0278	0.0273	0.0242	0.031	0.0315	0.0324	0.0285
Methylcyclohexane	0.0068	0.0073	0.0063	0.006	0.0074	0.0071	0.0056	0.0083	0.0087	0.0092	0.0073
2,2,4 Trimethylpentane	0.0011	0.0012	0.0011	0.001	0.0011	0.0011	0.0009	0.0012	0.0012	0.0013	0.0011
Benzene	0.0194	0.0225	0.0197	0.0181	0.0191	0.02	0.0183	0.0219	0.0221	0.023	0.0204
Toluene	0.0084	0.0069	0.0062	0.0062	0.0085	0.0083	0.0058	0.0099	0.0113	0.0125	0.0084
Ethylbenzene	0.0003	0.0001	0	0	0.0001	0.0002	0.0002	0.0002	0.0003	0.0004	0.0002
Xylenes	0.0018	0.0004	0.0005	0.0015	0.0007	0.0006	0.0003	0.0005	0.0006	0.0026	0.0010
C8+ Heavies	0.0025	0.002	0.0019	0.0018	0.0029	0.002	0.0016	0.0026	0.0036	0.0043	0.0025
Total	100										
HAPs	0.05%	0.06%	0.06%	0.06%	0.053%						
VOC	1.50%	1.47%	1.45%	1.43%	1.40%	1.41%	1.40%	1.46%	1.39%	1.41%	1.43%

**Flat Rock Compressor Station
Inlet Scrubber Condensate**

Liquids Analysis_Inlet Scrubber

Source of analysis: Flat Rock Inlet Scrubber
Date of analysis: 10/19/2017

Pollutant	Molecular Weight (lb/lb-mol)	Mol. Fraction (mol. %) ¹	Gas Weight (lb/lb-mol)	Weight Fraction (wt. %)
Methane	16.04	2.9235%	0.4690	0.42%
Ethane	30.07	0.49%	0.1482	0.13%
Total HC (Non-VOC)		3.4162%	0.6172	0.56%
Propane	44.10	0.43%	0.1909	0.17%
i-Butane	58.12	0.44%	0.2568	0.23%
n-Butane	58.12	0.48%	0.2782	0.25%
i-Pentane	72.15	0.99%	0.7175	0.65%
n-Pentane	72.15	0.66%	0.4756	0.43%
n-Hexane	86.18	1.6687%	1.4380	1.30%
Hexanes	86.18	2.88%	2.4829	2.24%
Heptanes	100.20	13.37%	13.3934	12.08%
Octanes	114.23	12.61%	14.4031	12.99%
Nonanes	128.26	18.08%	23.1886	20.91%
Decanes +	142.28	21.40%	30.4479	27.45%
2,2,4-Trimethylpentane	114.22	0.43%	0.4957	0.45%
Benzene	78.11	2.77%	2.1669	1.95%
Toluene	92.14	8.24%	7.5921	6.84%
Ethylbenzene	106.17	1.20%	1.2698	1.14%
o-Xylene	106.16	10.77%	11.4319	10.31%
Total NMNE VOC		96.4237%	110.2294	99.3803%
Water	18.02	0.000%	0.0000	0.00%
Carbon Dioxide	43.99	0.16%	0.0688	0.06%
Nitrogen	28.02	0.00%	0.0014	0.00%
H2S	34.06	0.000%	0.0000	0.00%
Helium	4.00	0.000%	0.0000	0.00%
Totals		100.00%	110.9167	100.00%

**Flat Rock Compressor Station
Fuel Usage**

Source	Annual Consumption (MMscf/yr)
Unit 6403 (C-200)	109.38
Unit 3146 (C-201)	84.25
Reboiler	4.64
Line Heater	0.05
Total (potential)	198.31
Total (2017 estimated actual) ¹	49.44

¹ Assumes 100% operation Startup (10/2) to 12/31.

Appendix C

Supporting Documentation for Emission Calculations

- Engine Specifications
- Extended Gas Analyses (dehydrator inlet)
- Liquids Analysis (storage tanks)
- Fuel Gas Analysis
- GLYCalc Report (dehydrator modeling)
- ProMax Report (storage tank modeling)
- Enclosed Combustor Specifications (Dehydrator BTEX Combustor, Tank Vapor Combustor)

Engine Specifications

Engine Specifications

Unit 6403 (C-200)



J-W POWER COMPANY

P.O. BOX 12340
LONGVIEW, TEXAS 75607
(903)643-3413

May 07, 2017

RE: Engine and compressor frame EPA regulatory status

J-W Power Company is supplying the following information for the natural gas fired engine source referenced below to aid in the permitting process. The information provided is a guide to help make applicability determinations regarding EPA NSPS 40 CFR Part 60 Subpart JJJJ, NSPS 40 CFR Part 60 Subpart OOOO, and/or NESHAP 40 CFR Part 63 Subpart ZZZZ only. Due to this being a guide, J-W Power Company in no way can guarantee the regulatory status or accuracy of the information, some data is provided by a third party.

Engine Make:	Waukesha
Engine Model:	L5794 GSI
Engine Serial Number:	C17001/1
Combustion Type:	4-Stroke, Rich Burn
Engine NSPS Status ¹ :	Applicable
Engine NESHAP Status ¹ :	Applicable (Complies by Complying with NSPS JJJJ)
Rated Engine Speed:	1200 RPM
Nameplate Horsepower:	1380 HP
Expected Horsepower ² :	1380 HP
Engine Manufacture Date ³ :	11/01/2007
Engine Modification Date ³ :	N/A
Engine Reconstruction Date ³ :	N/A
Compressor Make:	Ariel
Compressor Model:	JGT-4
Compressor Serial Number:	F-24995
Compressor Manufacture Date:	Before August 23, 2011
J-W Unit number:	6403

¹ Pursuant to J-W Power Company interpretation of 40 CFR Part 60 Subpart JJJJ and Part 63 Subpart ZZZZ, the above mentioned unit has the potential to be subject to the requirements of these rules. These interpretations are in no way guaranteed by J-W Power Company or any of its affiliates and should not be viewed as legally substantiated. Additionally, there may be requirements associated with the applicability of Subpart JJJJ or ZZZZ that are not expressed herein. It is strongly encouraged to review the information provided in accordance with all relevant state and federal rules to ensure the compliance.

² The available horsepower may be limited by the maximum RPM rating of the compressor frame or may be modified from the nameplate rating due to conversion.

³ The dates mentioned above are provided to J-W Power Company and may be subject to the interpretation of the engine manufacturer, engine dealer or others.



Tesoro Compressor Station - Flat Rock, UT

VHP - L5794GSI

afournoy@jwenergy.com Alex Flournoy 720 438 5501 J-W Power

Gas Compression - Continuous

ENGINE SPEED (rpm):	1200	NOx SELECTION (g/bhp-hr):	Customer Catalyst
DISPLACEMENT (in3):	5788	COOLING SYSTEM:	JW, IC + OC
COMPRESSION RATIO:	8.2:1	INTERCOOLER WATER INLET (°F):	130
IGNITION SYSTEM:	ESM	JACKET WATER OUTLET (°F):	180
EXHAUST MANIFOLD:	Water Cooled	JACKET WATER CAPACITY (gal):	107
COMBUSTION:	Rich Burn, Turbocharged	AUXILIARY WATER CAPACITY (gal):	11
ENGINE DRY WEIGHT (lbs):	21000	LUBE OIL CAPACITY (gal):	190
AIR/FUEL RATIO SETTING:	0.38% CO	MAX. EXHAUST BACKPRESSURE (in. H2O):	18
ENGINE SOUND LEVEL (dBA)	102	MAX. AIR INLET RESTRICTION (in. H2O):	15
		EXHAUST SOUND LEVEL (dBA)	111

SITE CONDITIONS:

FUEL:	Flat Rock Gas	ALTITUDE (ft):	7450
FUEL PRESSURE RANGE (psig):	30 - 60	MAXIMUM INLET AIR TEMPERATURE (°F):	90
FUEL HHV (BTU/ft3):	1,031.6	FUEL WKI:	90.9
FUEL LHV (BTU/ft3):	932.6		

SITE SPECIFIC TECHNICAL DATA

POWER RATING	UNITS	MAX RATING AT 100 °F AIR TEMP	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE OF 90 °F		
			100%	75%	55%
CONTINUOUS ENGINE POWER	BHP	1380	1380	1035	763
OVERLOAD	% 2/24 hr	0	0	-	-
MECHANICAL EFFICIENCY (LHV)	%	30.8	30.8	28.7	25.6
CONTINUOUS POWER AT FLYWHEEL	BHP	1280	1280	935	663

based on 50 HP cooling fan, 50 HP misc. power

FUEL CONSUMPTION

FUEL CONSUMPTION (LHV)	BTU/BHP-hr	7667	7667	8021	8628
FUEL CONSUMPTION (HHV)	BTU/BHP-hr	8481	8481	8873	9545
FUEL FLOW	SCFM	189	189	148	118

based on fuel analysis LHV

HEAT REJECTION

JACKET WATER (JW)	BTU/hr x 1000	3070	3045	2558	2148
LUBE OIL (OC)	BTU/hr x 1000	474	470	431	402
INTERCOOLER (IC)	BTU/hr x 1000	219	193	99	41
EXHAUST	BTU/hr x 1000	2906	2930	2172	1652
RADIATION	BTU/hr x 1000	606	635	569	525

EMISSIONS

NOx (NO + NO2)	g/bhp-hr	13.5	13.5	22.7	24.6
CO	g/bhp-hr	10.1	10.1	8.8	8.3
THC	g/bhp-hr	1.8	1.8	1.8	1.8
NMHC	g/bhp-hr	0.28	0.28	0.31	0.38
NM, NEHC	g/bhp-hr	0.10	0.10	0.11	0.14
CO2	g/bhp-hr	477	477	499	537
CO2e	g/bhp-hr	518	518	546	594
CH2O	g/bhp-hr	0.05	0.05	0.05	0.05
CH4	g/bhp-hr	1.56	1.56	1.75	2.15

AIR INTAKE / EXHAUST GAS

INDUCTION AIR FLOW	SCFM	2001	2001	1586	1262
EXHAUST GAS MASS FLOW	lb/hr	8986	8986	7124	5669
EXHAUST GAS FLOW	ACFM	6378	6378	4854	3749
EXHAUST TEMPERATURE	°F	1137	1137	1073	1028

at exhaust temp, 14.5 psia

HEAT EXCHANGER SIZING

TOTAL JACKET WATER CIRCUIT (JW)	BTU/hr x 1000	3481
TOTAL AUXILIARY WATER CIRCUIT (IC + OC)	BTU/hr x 1000	786

COOLING SYSTEM WITH ENGINE MOUNTED WATER PUMPS

JACKET WATER PUMP MIN. DESIGN FLOW	GPM	450
JACKET WATER PUMP MAX. EXTERNAL RESTRICTION	psig	16
AUX WATER PUMP MIN. DESIGN FLOW	GPM	79
AUX WATER PUMP MAX. EXTERNAL RESTRICTION	psig	44



DCL International Inc.

Mailing address: P.O. Box 90, Concord, Ontario, Canada, L4K 1B2
Toll free: 1-800-872-1968 Phone: 905-660-6450 Fax: 905-660-6435 E-mail: info@dcl-inc.com

To	Mark Davis	Telephone	903-291-2741
	J-W Power	Facsimile	903-643-3586
		Email	mdavis@jwoperating.com
Date	October 22, 2008	No. of Pages	1

RE: EMISSIONS GUARANTEE

Mark,

We hereby guarantee that our QUICK-LID™ Model DC75-12 catalytic converter described below:

Catalyst model	DC75
Catalyst coating	3-way
Outside Diameter of catalyst substrate	30.75"
No. of catalyst substrates	1
Cell Density	300 cpsi

and sized for the following engine:

Engine model	Waukesha 5794GSI
Power	1380 hp
Fuel	Pipeline Quality Natural Gas

will perform as follows:

Emissions	Before Catalyst	After Catalyst
Nitrogen Oxides (NOx)	14.5 g/bhp-hr	0.5 g/bhp-hr
Carbon Monoxide (CO)	11.0 g/bhp-hr	0.75 g/bhp-hr
Non-Methane Hydrocarbons (NMHCs)	0.45 g/bhp-hr	0.2 g/bhp-hr

for a period of 1 year or 8000 hours, whichever comes first, subject to all terms and conditions contained in the attached warranty document being respected and met.

Best regards,
DCL International, Inc.

Tawnya VanGroningen
Account Manager
North American Industrial Catalyst Division

Ref: Quote#16-990-R1

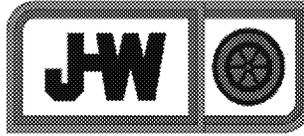
335-18162-00

MD 1-6-09

J-W
FOR
Issue
3/1

Engine Specifications

Unit 3146 (C-201)



J-W POWER COMPANY

P.O. BOX 12340
LONGVIEW, TEXAS 75607
(903)643-3413

May 07, 2017

RE: Engine and compressor frame EPA regulatory status

J-W Power Company is supplying the following information for the natural gas fired engine source referenced below to aid in the permitting process. The information provided is a guide to help make applicability determinations regarding EPA NSPS 40 CFR Part 60 Subpart JJJJ, NSPS 40 CFR Part 60 Subpart OOOO, and/or NESHAP 40 CFR Part 63 Subpart ZZZZ only. Due to this being a guide, J-W Power Company in no way can guarantee the regulatory status or accuracy of the information, some data is provided by a third party.

Engine Make:	Caterpillar
Engine Model:	G3516 TALE
Engine Serial Number:	4EK01632
Combustion Type:	4-Stroke, Lean Burn
Engine NSPS Status ¹ :	Not Applicable
Engine NESHAP Status ¹ :	Applicable
Rated Engine Speed:	1200 RPM
Nameplate Horsepower:	1085 HP
Expected Horsepower ² :	1085 HP
Engine Manufacture Date ³ :	11/11/1997
Engine Modification Date ³ :	N/A
Engine Reconstruction Date ³ :	N/A
Compressor Make:	Ariel
Compressor Model:	JGE-4
Compressor Serial Number:	F-11669
Compressor Manufacture Date:	Before August 23, 2011
J-W Unit number:	3146

¹ Pursuant to J-W Power Company interpretation of 40 CFR Part 60 Subpart JJJJ and Part 63 Subpart ZZZZ, the above mentioned unit has the potential to be subject to the requirements of these rules. These interpretations are in no way guaranteed by J-W Power Company or any of its affiliates and should not be viewed as legally substantiated. Additionally, there may be requirements associated with the applicability of Subpart JJJJ or ZZZZ that are not expressed herein. It is strongly encouraged to review the information provided in accordance with all relevant state and federal rules to ensure the compliance.

² The available horsepower may be limited by the maximum RPM rating of the compressor frame or may be modified from the nameplate rating due to conversion.

³ The dates mentioned above are provided to J-W Power Company and may be subject to the interpretation of the engine manufacturer, engine dealer or others.

G3516

NON-CURRENT

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA

Tesoro

Tesoro-Flat Rock Compressors



ENGINE SPEED (rpm): 1200
 COMPRESSION RATIO: 8
 AFTERCOOLER TYPE: SCAC
 AFTERCOOLER WATER INLET (°F): 130
 JACKET WATER OUTLET (°F): 210
 ASPIRATION: TA
 COOLING SYSTEM: JW+OC, AC
 CONTROL SYSTEM: EIS
 EXHAUST MANIFOLD: ASWC
 COMBUSTION: LOW EMISSION
 NOx EMISSION LEVEL (g/bhp-hr NOx): 2.0
 SET POINT TIMING: 31

RATING STRATEGY:
 RATING LEVEL:
 FUEL SYSTEM:
SITE CONDITIONS:
 FUEL:
 FUEL PRESSURE RANGE(psig): (See note 1)
 FUEL METHANE NUMBER:
 FUEL LHV (Btu/scf):
 ALTITUDE(ft):
 MAXIMUM INLET AIR TEMPERATURE(°F):
 STANDARD RATED POWER:

STANDARD
 CONTINUOUS
 HPG IMPCO
 Tesoro- Flat Rock
 35.0-40.0
 75.2
 934
 7450
 77
 1085 bhp@1200rpm

RATING	NOTES	LOAD	MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
			100%	100%	75%	55%
ENGINE POWER (WITHOUT FAN)	(2)	bhp	1075	985	739	543
INLET AIR TEMPERATURE		°F	32	77	77	77

ENGINE DATA							
FUEL CONSUMPTION (LHV)	(3)	Btu/bhp-hr	7497	7549	7764	8176	
FUEL CONSUMPTION (HHV)	(3)	Btu/bhp-hr	8308	8366	8604	9060	
AIR FLOW (@inlet air temp, 14.7 psia) (WET)	(4)(5)	ft ³ /min	2057	2065	1501	998	
AIR FLOW (WET)	(4)(5)	lb/hr	9957	9156	6655	4426	
FUEL FLOW (60°F, 14.7 psia)		scfm	144	133	102	79	
INLET MANIFOLD PRESSURE	(6)	in Hg(abs)	61.8	57.3	43.2	30.3	
EXHAUST TEMPERATURE - ENGINE OUTLET	(7)	°F	853	844	841	871	
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia) (WET)	(8)(5)	ft ³ /min	5950	5435	3959	2722	
EXHAUST GAS MASS FLOW (WET)	(8)(5)	lb/hr	10360	9528	6942	4648	

EMISSIONS DATA - ENGINE OUT							
NOx (as NO ₂)	(9)(10)	g/bhp-hr	2.00	2.00	2.81	3.78	
CO	(9)(10)	g/bhp-hr	2.00	2.10	2.27	2.09	
THC (mol. wt. of 15.84)	(9)(10)	g/bhp-hr	3.09	3.12	2.84	2.26	
NMHC (mol. wt. of 15.84)	(9)(10)	g/bhp-hr	0.46	0.47	0.43	0.34	
NMNEHC (VOCs) (mol. wt. of 15.84)	(9)(10)(11)	g/bhp-hr	0.31	0.31	0.28	0.23	
HCHO (Formaldehyde)	(9)(10)	g/bhp-hr	0.26	0.27	0.29	0.31	
CO ₂	(9)(10)	g/bhp-hr	503	507	529	548	
EXHAUST OXYGEN	(9)(12)	% DRY	7.9	7.8	7.3	6.9	

HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)	(13)	Btu/min	35014	33065	28366	25583	
HEAT REJ. TO ATMOSPHERE	(13)	Btu/min	4527	4275	3586	3037	
HEAT REJ. TO LUBE OIL (OC)	(13)	Btu/min	5536	5228	4485	4045	
HEAT REJ. TO AFTERCOOLER (AC)	(13)(14)	Btu/min	8028	8028	3903	1188	

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+OC)	(14)	Btu/min	45159
TOTAL AFTERCOOLER CIRCUIT (AC)	(14)(15)	Btu/min	8429
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

Extended Gas Analyses (dehydrator inlet)

Sample Dates:

- 12/6/2017
- 12/7/2017
- 12/8/2017
- 12/11/2017
- 12/12/2017
- 12/13/2017
- 12/14/2017
- 12/22/2017
- 12/27/2017
- 12/29/2017

QUESTAR ENERGY SERVICES

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

Description: FR comp discharge Company: Andeavor
Field: Flat Rock Station Data File: 002960.D
Meter Number: Discharge before contactor and D G.C. Method: GAS EXTENDED.M
Analysis Date/Time: 06-Dec-17, 17:22:39 GPA Method: GPA 2286
Date Sampled: 6-Dec-17 Sampled By: KC
Sample Temperature: 62 Analyst Initials: BMB
Sample Pressure: 905

Component	Mol%	Wt%	LV%
Methane	92.7514	83.8213	90.5395
Ethane	2.5537	4.3257	3.9438
Propane	0.6731	1.6720	1.0687
Isobutane	0.2785	0.9117	0.5249
n-Butane	0.1869	0.6120	0.3396
Neopentane	0.0060	0.0243	0.0132
Isopentane	0.1366	0.5550	0.2880
n-Pentane	0.0629	0.2556	0.1313
2,2-Dimethylbutane	0.0078	0.0378	0.0187
2,3-Dimethylbutane	0.0094	0.0454	0.0221
2-Methylpentane	0.0282	0.1368	0.0674
3-Methylpentane	0.0186	0.0904	0.0438
n-Hexane	0.0223	0.1082	0.0528
Heptanes	0.0699	0.3536	0.1464
Octanes	0.0023	0.0148	0.0066
Nonanes	0.0023	0.0142	0.0053
Decanes plus	0.0000	0.0000	0.0000
Nitrogen	0.9851	1.5546	0.6224
Carbon Dioxide	2.2050	5.4666	2.1655
Oxygen	ND	ND	ND
Hydrogen Sulfide	ND	ND	ND
Total	100.0000	100.0000	100.0000

Calculated Global Properties	Units	
Gross BTU/Real CF	1034.7	BTU/SCF at 60°F and 14.73 psia
Sat. Gross BTU/Real CF	1017.9	BTU/SCF at 60°F and 14.73 psia
Gas Compressibility (Z)	0.9977	
Specific Gravity	0.6147	air=1
Avg Molecular Weight	17.752	gm/mole
Propane GPM	0.184472	gal/MCF
Butane GPM	0.149675	gal/MCF
Gasoline GPM	0.135616	gal/MCF
26# Gasoline GPM	0.194500	gal/MCF
Total GPM	1.636304	gal/MCF
Base Mol%	100.599	%v/v

H2S detection limit 100 ppm (+/-)

Component	Mol%	Wt%	LV%
Benzene	0.0194	0.0856	0.0313
Toluene	0.0084	0.0435	0.0162
Ethylbenzene	0.0003	0.0017	0.0006
M&P Xylene	0.0013	0.0079	0.0029
O-Xylene	0.0005	0.0032	0.0012
2,2,4-Trimethylpentane	0.0011	0.0070	0.0032
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0067	0.0316	0.0131
Methylcyclohexane	0.0068	0.0377	0.0158
Description:	FR comp discharge		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	2.2050	5.4666	2.1655
Hydrogen Sulfide	ND	ND	ND
Nitrogen	0.9851	1.5546	0.6224
Methane	92.7514	83.8213	90.5395
Ethane	2.5537	4.3257	3.9438
Propane	0.6731	1.6720	1.0687
Isobutane	0.2785	0.9117	0.5249
n-Butane	0.1929	0.6120	0.3396
Isopentane	0.1366	0.5793	0.3012
n-Pentane	0.0629	0.2556	0.1313
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0223	0.1082	0.0528
Cyclohexane	0.0067	0.0316	0.0131
Other Hexanes	0.0640	0.3104	0.1520
Heptanes	0.0275	0.1482	0.0668
Methylcyclohexane	0.0068	0.0377	0.0158
2,2,4 Trimethylpentane	0.0011	0.0070	0.0032
Benzene	0.0194	0.0856	0.0313
Toluene	0.0084	0.0435	0.0162
Ethylbenzene	0.0003	0.0017	0.0006
Xylenes	0.0018	0.0111	0.0041
C8+ Heavies	0.0025	0.0162	0.0072
Subtotal	100.0000	100.0000	100.0000
Oxygen	ND	ND	ND
Total	100.0000	100.0000	100.0000

QUESTAR ENERGY SERVICES

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

Description:	FR before contactor and dehy	Company:	Andeavor
Field:	Flat Rock Station	Data File:	002967.D
Meter Number:	Before contactor and dehy	G.C. Method:	GAS EXTENDED.M
Analysis Date/Time:	07-Dec-17, 16:02:44	GPA Method:	GPA 2286
Date Sampled:	7-Dec-17	Sampled By:	BB
Sample Temperature:	70	Analyst Initials:	BMB
Sample Pressure:	905		

Component	Mol%	Wt%	LV%
Methane	92.9303	84.2017	90.7200
Ethane	2.5619	4.3509	3.9567
Propane	0.6649	1.6558	1.0558
Isobutane	0.2615	0.8583	0.4929
n-Butane	0.1739	0.5709	0.3160
Neopentane	0.0059	0.0240	0.0130
Isopentane	0.1327	0.5407	0.2799
n-Pentane	0.0612	0.2492	0.1276
2,2-Dimethylbutane	0.0083	0.0403	0.0199
2,3-Dimethylbutane	0.0099	0.0480	0.0233
2-Methylpentane	0.0293	0.1427	0.0701
3-Methylpentane	0.0197	0.0959	0.0463
n-Hexane	0.0237	0.1155	0.0562
Heptanes	0.0767	0.3893	0.1613
Octanes	0.0019	0.0133	0.0060
Nonanes	0.0006	0.0038	0.0014
Decanes plus	0.0000	0.0000	0.0000
Nitrogen	0.9415	1.4897	0.5949
Carbon Dioxide	2.0961	5.2100	2.0587
Oxygen	ND	ND	ND
Hydrogen Sulfide	ND	ND	ND
Total	100.0000	100.0000	100.0000

Calculated Global Properties	Units	
Gross BTU/Real CF	1035.7	BTU/SCF at 60°F and 14.73 psia
Sat. Gross BTU/Real CF	1018.9	BTU/SCF at 60°F and 14.73 psia
Gas Compressibility (Z)	0.9977	
Specific Gravity	0.6132	air=1
Avg Molecular Weight	17.706	gm/mole
Propane GPM	0.182224	gal/MCF
Butane GPM	0.140038	gal/MCF
Gasoline GPM	0.137689	gal/MCF
26# Gasoline GPM	0.192429	gal/MCF
Total GPM	1.604743	gal/MCF
Base Mol%	100.339	%v/v

H2S detection limit 100 ppm (+/-)

Component	Mol%	Wt%	LV%
Benzene	0.0225	0.0992	0.0363
Toluene	0.0069	0.0361	0.0134
Ethylbenzene	0.0001	0.0007	0.0002
M&P Xylene	0.0002	0.0011	0.0004
O-Xylene	0.0002	0.0012	0.0004
2,2,4-Trimethylpentane	0.0012	0.0079	0.0035
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0079	0.0375	0.0155
Methylcyclohexane	0.0073	0.0406	0.0170
Description:	FR before contactor and dehy		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	2.0961	5.2100	2.0587
Hydrogen Sulfide	ND	ND	ND
Nitrogen	0.9415	1.4897	0.5949
Methane	92.9303	84.2017	90.7200
Ethane	2.5619	4.3509	3.9567
Propane	0.6649	1.6558	1.0558
Isobutane	0.2615	0.8583	0.4929
n-Butane	0.1798	0.5709	0.3160
Isopentane	0.1327	0.5647	0.2929
n-Pentane	0.0612	0.2492	0.1276
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0237	0.1155	0.0562
Cyclohexane	0.0079	0.0375	0.0155
Other Hexanes	0.0672	0.3269	0.1596
Heptanes	0.0309	0.1680	0.0756
Methylcyclohexane	0.0073	0.0406	0.0170
2,2,4 Trimethylpentane	0.0012	0.0079	0.0035
Benzene	0.0225	0.0992	0.0363
Toluene	0.0069	0.0361	0.0134
Ethylbenzene	0.0001	0.0007	0.0002
Xylenes	0.0004	0.0023	0.0008
C8+ Heavies	0.0020	0.0141	0.0064
Subtotal	100.0000	100.0000	100.0000
Oxygen	ND	ND	ND
Total	100.0000	100.0000	100.0000

QUESTAR ENERGY SERVICES

1210 D. Street, Rock Springs, Wyoming 82901
(307) 352-7292

Description: FR Comp before Contactor and de Company: Andeavor
Field: Flat Rock Station Data File: 002974.D
Meter Number: Before contactor and dehy G.C. Method: GAS EXTENDED.M
Analysis Date/Time: 08-Dec-17, 15:18:11 GPA Method: GPA 2286
Date Sampled: 8-Dec-17 Sampled By: BB
Sample Temperature: 78 Analyst Initials: BMB
Sample Pressure: 915

Component	Mol%	Wt%	LV%
Methane	92.8430	84.0714	90.6623
Ethane	2.5688	4.3599	3.9686
Propane	0.6611	1.6453	1.0500
Isobutane	0.2684	0.8805	0.5061
n-Butane	0.1742	0.5714	0.3165
Neopentane	0.0059	0.0241	0.0130
Isopentane	0.1290	0.5254	0.2722
n-Pentane	0.0573	0.2332	0.1196
2,2-Dimethylbutane	0.0077	0.0372	0.0184
2,3-Dimethylbutane	0.0090	0.0437	0.0212
2-Methylpentane	0.0271	0.1318	0.0648
3-Methylpentane	0.0180	0.0878	0.0424
n-Hexane	0.0214	0.1042	0.0508
Heptanes	0.0677	0.3423	0.1418
Octanes	0.0019	0.0120	0.0053
Nonanes	0.0005	0.0026	0.0009
Decanes plus	0.0000	0.0000	0.0000
Nitrogen	0.9639	1.5241	0.6092
Carbon Dioxide	2.1751	5.4031	2.1369
Oxygen	ND	ND	ND
Hydrogen Sulfide	ND	ND	ND
Total	100.0000	100.0000	100.0000

Calculated Global Properties	Units	
Gross BTU/Real CF	1033.9	BTU/SCF at 60°F and 14.73 psia
Sat. Gross BTU/Real CF	1017.2	BTU/SCF at 60°F and 14.73 psia
Gas Compressibility (Z)	0.9977	
Specific Gravity	0.6135	air=1
Avg Molecular Weight	17.717	gm/mole
Propane GPM	0.181183	gal/MCF
Butane GPM	0.142385	gal/MCF
Gasoline GPM	0.128627	gal/MCF
26# Gasoline GPM	0.183405	gal/MCF
Total GPM	1.614532	gal/MCF
Base Mol%	100.174	%v/v

H2S detection limit 100 ppm (+/-)

Component	Mol%	Wt%	LV%
Benzene	0.0197	0.0870	0.0318
Toluene	0.0062	0.0320	0.0119
Ethylbenzene	0.0000	0.0000	0.0000
M&P Xylene	0.0002	0.0009	0.0003
O-Xylene	0.0003	0.0017	0.0006
2,2,4-Trimethylpentane	0.0011	0.0068	0.0031
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0070	0.0331	0.0137
Methylcyclohexane	0.0063	0.0348	0.0145
Description:	FR Comp before Contactor and dehy		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	2.1751	5.4031	2.1369
Hydrogen Sulfide	ND	ND	ND
Nitrogen	0.9639	1.5241	0.6092
Methane	92.8430	84.0714	90.6623
Ethane	2.5688	4.3599	3.9686
Propane	0.6611	1.6453	1.0500
Isobutane	0.2684	0.8805	0.5061
n-Butane	0.1801	0.5714	0.3165
Isopentane	0.1290	0.5495	0.2852
n-Pentane	0.0573	0.2332	0.1196
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0214	0.1042	0.0508
Cyclohexane	0.0070	0.0331	0.0137
Other Hexanes	0.0618	0.3005	0.1468
Heptanes	0.0274	0.1486	0.0668
Methylcyclohexane	0.0063	0.0348	0.0145
2,2,4 Trimethylpentane	0.0011	0.0068	0.0031
Benzene	0.0197	0.0870	0.0318
Toluene	0.0062	0.0320	0.0119
Ethylbenzene	0.0000	0.0000	0.0000
Xylenes	0.0005	0.0026	0.0009
C8+ Heavies	0.0019	0.0120	0.0053
Subtotal	100.0000	100.0000	100.0000
Oxygen	ND	ND	ND
Total	100.0000	100.0000	100.0000

QUESTAR ENERGY SERVICES

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

Description: FR Comp before contactor and de Company: Andeavor
Field: Flat Rock Station Data File: 002985.D
Meter Number: Before contactor and dehy G.C. Method: GAS EXTENDED.M
Analysis Date/Time: 11-Dec-17, 16:08:16 GPA Method: GPA 2286
Date Sampled: 11-Dec-17 Sampled By: BB
Sample Temperature: 70 Analyst Initials: BMB
Sample Pressure: 910

Component	Mol%	Wt%	LV%
Methane	92.9290	84.2744	90.7586
Ethane	2.5716	4.3712	3.9735
Propane	0.6618	1.6496	1.0513
Isobutane	0.2618	0.8602	0.4938
n-Butane	0.1729	0.5682	0.3143
Neopentane	0.0058	0.0235	0.0127
Isopentane	0.1243	0.5070	0.2623
n-Pentane	0.0554	0.2260	0.1157
2,2-Dimethylbutane	0.0073	0.0357	0.0176
2,3-Dimethylbutane	0.0084	0.0410	0.0199
2-Methylpentane	0.0253	0.1232	0.0605
3-Methylpentane	0.0169	0.0822	0.0397
n-Hexane	0.0200	0.0974	0.0474
Heptanes	0.0624	0.3171	0.1312
Octanes	0.0018	0.0120	0.0054
Nonanes	0.0015	0.0091	0.0033
Decanes plus	0.0000	0.0000	0.0000
Nitrogen	0.9343	1.4795	0.5905
Carbon Dioxide	2.1395	5.3227	2.1023
Oxygen	ND	ND	ND
Hydrogen Sulfide	ND	ND	ND
Total	100.0000	100.0000	100.0000

Calculated Global Properties	Units	
Gross BTU/Real CF	1033.9	BTU/SCF at 60°F and 14.73 psia
Sat. Gross BTU/Real CF	1017.1	BTU/SCF at 60°F and 14.73 psia
Gas Compressibility (Z)	0.9977	
Specific Gravity	0.6126	air=1
Avg Molecular Weight	17.690	gm/mole
Propane GPM	0.181375	gal/MCF
Butane GPM	0.139822	gal/MCF
Gasoline GPM	0.122165	gal/MCF
26# Gasoline GPM	0.176535	gal/MCF
Total GPM	1.597368	gal/MCF
Base Mol%	100.487	%v/v

H2S detection limit 100 ppm (+/-)

Component	Mol%	Wt%	LV%
Benzene	0.0181	0.0801	0.0293
Toluene	0.0062	0.0323	0.0120
Ethylbenzene	0.0000	0.0000	0.0000
M&P Xylene	0.0002	0.0011	0.0004
O-Xylene	0.0013	0.0080	0.0029
2,2,4-Trimethylpentane	0.0010	0.0062	0.0028
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0061	0.0291	0.0120
Methylcyclohexane	0.0060	0.0333	0.0139
Description:	FR Comp before contactor and dehy		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	2.1395	5.3227	2.1023
Hydrogen Sulfide	ND	ND	ND
Nitrogen	0.9343	1.4795	0.5905
Methane	92.9290	84.2744	90.7586
Ethane	2.5716	4.3712	3.9735
Propane	0.6618	1.6496	1.0513
Isobutane	0.2618	0.8602	0.4938
n-Butane	0.1787	0.5682	0.3143
Isopentane	0.1243	0.5305	0.2750
n-Pentane	0.0554	0.2260	0.1157
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0200	0.0974	0.0474
Cyclohexane	0.0061	0.0291	0.0120
Other Hexanes	0.0579	0.2821	0.1377
Heptanes	0.0250	0.1361	0.0612
Methylcyclohexane	0.0060	0.0333	0.0139
2,2,4 Trimethylpentane	0.0010	0.0062	0.0028
Benzene	0.0181	0.0801	0.0293
Toluene	0.0062	0.0323	0.0120
Ethylbenzene	0.0000	0.0000	0.0000
Xylenes	0.0015	0.0091	0.0033
C8+ Heavies	0.0018	0.0120	0.0054
Subtotal	100.0000	100.0000	100.0000
Oxygen	ND	ND	ND
Total	100.0000	100.0000	100.0000

QUESTAR ENERGY SERVICES

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

Description: FR Comp before contactor and de Company: Andeavor
Field: Flat Rock Station Data File: 002990.D
Meter Number: Before contactor and dehy G.C. Method: GAS EXTENDED.M
Analysis Date/Time: 12-Dec-17, 15:33:02 GPA Method: GPA 2286
Date Sampled: 12-Dec-17 Sampled By: BB
Sample Temperature: 74 Analyst Initials: BMB
Sample Pressure: 910

Component	Mol%	Wt%	LV%
Methane	92.6082	83.8857	90.6439
Ethane	2.5127	4.2660	3.8909
Propane	0.6353	1.5819	1.0116
Isobutane	0.2603	0.8542	0.4920
n-Butane	0.1693	0.5555	0.3084
Neopentane	0.0060	0.0246	0.0134
Isopentane	0.1220	0.4970	0.2580
n-Pentane	0.0543	0.2212	0.1136
2,2-Dimethylbutane	0.0074	0.0360	0.0178
2,3-Dimethylbutane	0.0083	0.0403	0.0196
2-Methylpentane	0.0252	0.1227	0.0605
3-Methylpentane	0.0169	0.0823	0.0399
n-Hexane	0.0203	0.0990	0.0483
Heptanes	0.0708	0.3604	0.1496
Octanes	0.0029	0.0191	0.0087
Nonanes	0.0008	0.0047	0.0018
Decanes plus	0.0000	0.0000	0.0000
Nitrogen	1.4353	2.2702	0.9092
Carbon Dioxide	2.0440	5.0792	2.0128
Oxygen	ND	ND	ND
Hydrogen Sulfide	ND	ND	ND
Total	100.0000	100.0000	100.0000

Calculated Global Properties	Units	
Gross BTU/Real CF	1029.0	BTU/SCF at 60°F and 14.73 psia
Sat. Gross BTU/Real CF	1012.3	BTU/SCF at 60°F and 14.73 psia
Gas Compressibility (Z)	0.9977	
Specific Gravity	0.6133	air=1
Avg Molecular Weight	17.711	gm/mole
Propane GPM	0.174112	gal/MCF
Butane GPM	0.138200	gal/MCF
Gasoline GPM	0.124608	gal/MCF
26# Gasoline GPM	0.177845	gal/MCF
Total GPM	1.613873	gal/MCF
Base Mol%	100.313	%v/v

H2S detection limit 100 ppm (+/-)

Component	Mol%	Wt%	LV%
Benzene	0.0191	0.0841	0.0308
Toluene	0.0085	0.0440	0.0164
Ethylbenzene	0.0001	0.0008	0.0003
M&P Xylene	0.0002	0.0012	0.0005
O-Xylene	0.0005	0.0027	0.0010
2,2,4-Trimethylpentane	0.0011	0.0070	0.0031
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0069	0.0329	0.0136
Methylcyclohexane	0.0074	0.0412	0.0172
Description:	FR Comp before contactor and dehy		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	2.0440	5.0792	2.0128
Hydrogen Sulfide	ND	ND	ND
Nitrogen	1.4353	2.2702	0.9092
Methane	92.6082	83.8857	90.6439
Ethane	2.5127	4.2660	3.8909
Propane	0.6353	1.5819	1.0116
Isobutane	0.2603	0.8542	0.4920
n-Butane	0.1753	0.5555	0.3084
Isopentane	0.1220	0.5216	0.2714
n-Pentane	0.0543	0.2212	0.1136
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0203	0.0990	0.0483
Cyclohexane	0.0069	0.0329	0.0136
Other Hexanes	0.0578	0.2813	0.1378
Heptanes	0.0278	0.1512	0.0685
Methylcyclohexane	0.0074	0.0412	0.0172
2,2,4 Trimethylpentane	0.0011	0.0070	0.0031
Benzene	0.0191	0.0841	0.0308
Toluene	0.0085	0.0440	0.0164
Ethylbenzene	0.0001	0.0008	0.0003
Xylenes	0.0007	0.0039	0.0015
C8+ Heavies	0.0029	0.0191	0.0087
Subtotal	100.0000	100.0000	100.0000
Oxygen	ND	ND	ND
Total	100.0000	100.0000	100.0000

QUESTAR ENERGY SERVICES

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

Description: FR Comp before contactor and de Company: Andeavor
Field: Flat Rock Station Data File: 002996.D
Meter Number: Before contactor and dehy G.C. Method: GAS EXTENDED.M
Analysis Date/Time: 13-Dec-17, 15:45:36 GPA Method: GPA 2286
Date Sampled: 13-Dec-17 Sampled By: BB
Sample Temperature: 71 Analyst Initials: BMB
Sample Pressure: 910

Component	Mol%	Wt%	LV%
Methane	92.9261	84.2504	90.7912
Ethane	2.5358	4.3092	3.9196
Propane	0.6372	1.5878	1.0126
Isobutane	0.2607	0.8562	0.4918
n-Butane	0.1673	0.5496	0.3042
Neopentane	0.0059	0.0239	0.0129
Isopentane	0.1249	0.5091	0.2636
n-Pentane	0.0551	0.2246	0.1151
2,2-Dimethylbutane	0.0077	0.0375	0.0185
2,3-Dimethylbutane	0.0087	0.0423	0.0205
2-Methylpentane	0.0262	0.1276	0.0627
3-Methylpentane	0.0176	0.0859	0.0415
n-Hexane	0.0208	0.1015	0.0494
Heptanes	0.0706	0.3584	0.1481
Octanes	0.0020	0.0133	0.0060
Nonanes	0.0008	0.0049	0.0019
Decanes plus	0.0000	0.0000	0.0000
Nitrogen	0.9660	1.5292	0.6108
Carbon Dioxide	2.1666	5.3886	2.1296
Oxygen	ND	ND	ND
Hydrogen Sulfide	ND	ND	ND
Total	100.0000	100.0000	100.0000

Calculated Global Properties	Units	
Gross BTU/Real CF	1032.9	BTU/SCF at 60°F and 14.73 psia
Sat.Gross BTU/Real CF	1016.1	BTU/SCF at 60°F and 14.73 psia
Gas Compressibility (Z)	0.9977	
Specific Gravity	0.6128	air=1
Avg Molecular Weight	17.695	gm/mole
Propane GPM	0.174633	gal/MCF
Butane GPM	0.137702	gal/MCF
Gasoline GPM	0.126439	gal/MCF
26# Gasoline GPM	0.179048	gal/MCF
Total GPM	1.591254	gal/MCF
Base Mol%	100.374	%v/v

H2S detection limit 100 ppm (+/-)

Component	Mol%	Wt%	LV%
Benzene	0.0200	0.0881	0.0322
Toluene	0.0083	0.0433	0.0160
Ethylbenzene	0.0002	0.0013	0.0005
M&P Xylene	0.0006	0.0036	0.0014
O-Xylene	0.0000	0.0000	0.0000
2,2,4-Trimethylpentane	0.0011	0.0070	0.0032
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0068	0.0321	0.0133
Methylcyclohexane	0.0071	0.0394	0.0165
Description:	FR Comp before contactor and dehy		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	2.1666	5.3886	2.1296
Hydrogen Sulfide	ND	ND	ND
Nitrogen	0.9660	1.5292	0.6108
Methane	92.9261	84.2504	90.7912
Ethane	2.5358	4.3092	3.9196
Propane	0.6372	1.5878	1.0126
Isobutane	0.2607	0.8562	0.4918
n-Butane	0.1732	0.5496	0.3042
Isopentane	0.1249	0.5330	0.2765
n-Pentane	0.0551	0.2246	0.1151
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0208	0.1015	0.0494
Cyclohexane	0.0068	0.0321	0.0133
Other Hexanes	0.0602	0.2933	0.1432
Heptanes	0.0273	0.1485	0.0669
Methylcyclohexane	0.0071	0.0394	0.0165
2,2,4 Trimethylpentane	0.0011	0.0070	0.0032
Benzene	0.0200	0.0881	0.0322
Toluene	0.0083	0.0433	0.0160
Ethylbenzene	0.0002	0.0013	0.0005
Xylenes	0.0006	0.0036	0.0014
C8+ Heavies	0.0020	0.0133	0.0060
Subtotal	100.0000	100.0000	100.0000
Oxygen	ND	ND	ND
Total	100.0000	100.0000	100.0000

QUESTAR ENERGY SERVICES

1210 D. Street, Rock Springs, Wyoming 82901
(307) 352-7292

Description: FR Comp before contactor and de Company: Andeavor
Field: Flat Rock Data File: 003001.D
Meter Number: Before contactor and dehy G.C. Method: GAS EXTENDED.M
Analysis Date/Time: 14-Dec-17, 16:26:53 GPA Method: GPA 2286
Date Sampled: 14-Dec-17 Sampled By: BB
Sample Temperature: 70 Analyst Initials: BMB
Sample Pressure: 910

Component	Mol%	Wt%	LV%
Methane	92.9107	84.2770	90.8061
Ethane	2.5269	4.2962	3.9072
Propane	0.6390	1.5931	1.0158
Isobutane	0.2633	0.8651	0.4969
n-Butane	0.1695	0.5570	0.3083
Neopentane	0.0060	0.0244	0.0132
Isopentane	0.1264	0.5157	0.2670
n-Pentane	0.0553	0.2256	0.1156
2,2-Dimethylbutane	0.0075	0.0367	0.0181
2,3-Dimethylbutane	0.0085	0.0416	0.0202
2-Methylpentane	0.0257	0.1254	0.0616
3-Methylpentane	0.0172	0.0837	0.0404
n-Hexane	0.0201	0.0980	0.0477
Heptanes	0.0609	0.3093	0.1278
Octanes	0.0016	0.0100	0.0044
Nonanes	0.0005	0.0026	0.0010
Decanes plus	0.0000	0.0000	0.0000
Nitrogen	1.0246	1.6228	0.6481
Carbon Dioxide	2.1363	5.3158	2.1006
Oxygen	ND	ND	ND
Hydrogen Sulfide	ND	ND	ND
Total	100.0000	100.0000	100.0000

Calculated Global Properties	Units	
Gross BTU/Real CF	1032.2	BTU/SCF at 60°F and 14.73 psia
Sat. Gross BTU/Real CF	1015.5	BTU/SCF at 60°F and 14.73 psia
Gas Compressibility (Z)	0.9977	
Specific Gravity	0.6124	air=1
Avg Molecular Weight	17.686	gm/mole
Propane GPM	0.175126	gal/MCF
Butane GPM	0.139242	gal/MCF
Gasoline GPM	0.122789	gal/MCF
26# Gasoline GPM	0.176089	gal/MCF
Total GPM	1.588128	gal/MCF
Base Mol%	100.107	%v/v

H2S detection limit 100 ppm (+/-)

Component	Mol%	Wt%	LV%
Benzene	0.0183	0.0809	0.0296
Toluene	0.0058	0.0304	0.0113
Ethylbenzene	0.0002	0.0011	0.0004
M&P Xylene	0.0000	0.0000	0.0000
O-Xylene	0.0003	0.0015	0.0006
2,2,4-Trimethylpentane	0.0009	0.0061	0.0027
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0061	0.0288	0.0119
Methylcyclohexane	0.0056	0.0312	0.0130
Description:	FR Comp before contactor and dehy		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	2.1363	5.3158	2.1006
Hydrogen Sulfide	ND	ND	ND
Nitrogen	1.0246	1.6228	0.6481
Methane	92.9107	84.2770	90.8061
Ethane	2.5269	4.2962	3.9072
Propane	0.6390	1.5931	1.0158
Isobutane	0.2633	0.8651	0.4969
n-Butane	0.1755	0.5570	0.3083
Isopentane	0.1264	0.5401	0.2802
n-Pentane	0.0553	0.2256	0.1156
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0201	0.0980	0.0477
Cyclohexane	0.0061	0.0288	0.0119
Other Hexanes	0.0589	0.2874	0.1403
Heptanes	0.0242	0.1319	0.0593
Methylcyclohexane	0.0056	0.0312	0.0130
2,2,4 Trimethylpentane	0.0009	0.0061	0.0027
Benzene	0.0183	0.0809	0.0296
Toluene	0.0058	0.0304	0.0113
Ethylbenzene	0.0002	0.0011	0.0004
Xylenes	0.0003	0.0015	0.0006
C8+ Heavies	0.0016	0.0100	0.0044
Subtotal	100.0000	100.0000	100.0000
Oxygen	ND	ND	ND
Total	100.0000	100.0000	100.0000

QUESTAR ENERGY SERVICES

1210 D. Street, Rock Springs, Wyoming 82901
(307) 352-7292

Description: FR before contactor and dehy Company: Andeavor
Field: Flat Rock Data File: 003003.D
Meter Number: Before contactor and dehy G.C. Method: GAS EXTENDED.M
Analysis Date/Time: 22-Dec-17, 17:38:45 GPA Method: GPA 2286
Date Sampled: 22-Dec-17 Sampled By: BB
Sample Temperature: 60 Analyst Initials: BMB
Sample Pressure: 910

Component	Mol%	Wt%	LV%
Methane	92.9011	84.1253	90.7112
Ethane	2.5412	4.3132	3.9257
Propane	0.6555	1.6317	1.0412
Isobutane	0.2681	0.8797	0.5056
n-Butane	0.1734	0.5689	0.3151
Neopentane	0.0059	0.0242	0.0131
Isopentane	0.1288	0.5246	0.2718
n-Pentane	0.0565	0.2301	0.1180
2,2-Dimethylbutane	0.0077	0.0373	0.0185
2,3-Dimethylbutane	0.0090	0.0439	0.0213
2-Methylpentane	0.0268	0.1305	0.0642
3-Methylpentane	0.0181	0.0882	0.0426
n-Hexane	0.0218	0.1062	0.0517
Heptanes	0.0802	0.4082	0.1689
Octanes	0.0025	0.0166	0.0075
Nonanes	0.0008	0.0050	0.0020
Decanes plus	0.0000	0.0000	0.0000
Nitrogen	0.9312	1.4724	0.5885
Carbon Dioxide	2.1714	5.3940	2.1331
Oxygen	ND	ND	ND
Hydrogen Sulfide	ND	ND	ND
Total	100.0000	100.0000	100.0000

Calculated Global Properties	Units	
Gross BTU/Real CF	1034.5	BTU/SCF at 60°F and 14.73 psia
Sat. Gross BTU/Real CF	1017.7	BTU/SCF at 60°F and 14.73 psia
Gas Compressibility (Z)	0.9977	
Specific Gravity	0.6135	air=1
Avg Molecular Weight	17.716	gm/mole
Propane GPM	0.179648	gal/MCF
Butane GPM	0.142035	gal/MCF
Gasoline GPM	0.133085	gal/MCF
26# Gasoline GPM	0.187667	gal/MCF
Total GPM	1.605812	gal/MCF
Base Mol%	99.396	%v/v

H2S detection limit 100 ppm (+/-)

Component	Mol%	Wt%	LV%
Benzene	0.0219	0.0964	0.0353
Toluene	0.0099	0.0515	0.0191
Ethylbenzene	0.0002	0.0013	0.0005
M&P Xylene	0.0005	0.0029	0.0011
O-Xylene	0.0000	0.0000	0.0000
2,2,4-Trimethylpentane	0.0012	0.0079	0.0036
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0079	0.0374	0.0155
Methylcyclohexane	0.0083	0.0461	0.0193
Description:	FR before contactor and dehy		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	2.1714	5.3940	2.1331
Hydrogen Sulfide	ND	ND	ND
Nitrogen	0.9312	1.4724	0.5885
Methane	92.9011	84.1253	90.7112
Ethane	2.5412	4.3132	3.9257
Propane	0.6555	1.6317	1.0412
Isobutane	0.2681	0.8797	0.5056
n-Butane	0.1793	0.5689	0.3151
Isopentane	0.1288	0.5488	0.2849
n-Pentane	0.0565	0.2301	0.1180
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0218	0.1062	0.0517
Cyclohexane	0.0079	0.0374	0.0155
Other Hexanes	0.0616	0.2999	0.1466
Heptanes	0.0310	0.1689	0.0761
Methylcyclohexane	0.0083	0.0461	0.0193
2,2,4 Trimethylpentane	0.0012	0.0079	0.0036
Benzene	0.0219	0.0964	0.0353
Toluene	0.0099	0.0515	0.0191
Ethylbenzene	0.0002	0.0013	0.0005
Xylenes	0.0005	0.0029	0.0011
C8+ Heavies	0.0026	0.0174	0.0079
Subtotal	100.0000	100.0000	100.0000
Oxygen	ND	ND	ND
Total	100.0000	100.0000	100.0000

QUESTAR ENERGY SERVICES

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

Description:	FR before contactor and dehy	Company:	Andeavor
Field:	Flat Rock	Data File:	003009.D
Meter Number:	FR before contactor and dehy	G.C. Method:	GAS EXTENDED.M
Analysis Date/Time:	28-Dec-17, 11:11:04	GPA Method:	GPA 2286
Date Sampled:	27-Dec-17	Sampled By:	BB
Sample Temperature:	78	Analyst Initials:	BMB
Sample Pressure:	956		

Component	Mol%	Wt%	LV%
Methane	92.9923	84.3328	90.8847
Ethane	2.4851	4.2242	3.8425
Propane	0.6158	1.5351	0.9790
Isobutane	0.2573	0.8453	0.4855
n-Butane	0.1610	0.5288	0.2928
Neopentane	0.0058	0.0237	0.0128
Isopentane	0.1226	0.4999	0.2589
n-Pentane	0.0537	0.2189	0.1121
2,2-Dimethylbutane	0.0075	0.0365	0.0180
2,3-Dimethylbutane	0.0089	0.0434	0.0211
2-Methylpentane	0.0267	0.1299	0.0639
3-Methylpentane	0.0180	0.0879	0.0425
n-Hexane	0.0216	0.1053	0.0513
Heptanes	0.0828	0.4221	0.1742
Octanes	0.0034	0.0220	0.0099
Nonanes	0.0011	0.0072	0.0027
Decanes plus	0.0000	0.0000	0.0000
Nitrogen	0.9574	1.5161	0.6056
Carbon Dioxide	2.1790	5.4209	2.1425
Oxygen	ND	ND	ND
Hydrogen Sulfide	ND	ND	ND
Total	100.0000	100.0000	100.0000

Calculated Global Properties	Units	
Gross BTU/Real CF	1032.4	BTU/SCF at 60°F and 14.73 psia
Sat. Gross BTU/Real CF	1015.7	BTU/SCF at 60°F and 14.73 psia
Gas Compressibility (Z)	0.9977	
Specific Gravity	0.6127	air=1
Avg Molecular Weight	17.690	gm/mole
Propane GPM	0.168768	gal/MCF
Butane GPM	0.134611	gal/MCF
Gasoline GPM	0.130732	gal/MCF
26# Gasoline GPM	0.181471	gal/MCF
Total GPM	1.574679	gal/MCF
Base Mol%	101.597	%v/v

H2S detection limit 100 ppm (+/-)

Component	Mol%	Wt%	LV%
Benzene	0.0221	0.0975	0.0356
Toluene	0.0113	0.0587	0.0218
Ethylbenzene	0.0003	0.0019	0.0007
M&P Xylene	0.0006	0.0039	0.0014
O-Xylene	0.0000	0.0000	0.0000
2,2,4-Trimethylpentane	0.0012	0.0080	0.0036
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0080	0.0379	0.0156
Methylcyclohexane	0.0087	0.0482	0.0201
Description:	FR before contactor and dehy		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	2.1790	5.4209	2.1425
Hydrogen Sulfide	ND	ND	ND
Nitrogen	0.9574	1.5161	0.6056
Methane	92.9923	84.3328	90.8847
Ethane	2.4851	4.2242	3.8425
Propane	0.6158	1.5351	0.9790
Isobutane	0.2573	0.8453	0.4855
n-Butane	0.1668	0.5288	0.2928
Isopentane	0.1226	0.5236	0.2717
n-Pentane	0.0537	0.2189	0.1121
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0216	0.1053	0.0513
Cyclohexane	0.0080	0.0379	0.0156
Other Hexanes	0.0611	0.2977	0.1455
Heptanes	0.0315	0.1718	0.0775
Methylcyclohexane	0.0087	0.0482	0.0201
2,2,4 Trimethylpentane	0.0012	0.0080	0.0036
Benzene	0.0221	0.0975	0.0356
Toluene	0.0113	0.0587	0.0218
Ethylbenzene	0.0003	0.0019	0.0007
Xylenes	0.0006	0.0039	0.0014
C8+ Heavies	0.0036	0.0234	0.0105
Subtotal	100.0000	100.0000	100.0000
Oxygen	ND	ND	ND
Total	100.0000	100.0000	100.0000

QUESTAR ENERGY SERVICES

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

Description: FR before contactor and dehy Company: Andeavor
Field: Flat Rock Data File: 003015.D
Meter Number: FR before contactor and dehy G.C. Method: GAS EXTENDED.M
Analysis Date/Time: 30-Dec-17, 11:03:35 GPA Method: GPA 2286
Date Sampled: 29-Dec-17 Sampled By: SW
Sample Temperature: 80 Analyst Initials: BMB
Sample Pressure: 970

Component	Mol%	Wt%	LV%
Methane	93.0343	84.3812	90.9005
Ethane	2.4829	4.2210	3.8381
Propane	0.6223	1.5513	0.9890
Isobutane	0.2567	0.8436	0.4844
n-Butane	0.1631	0.5359	0.2965
Neopentane	0.0058	0.0238	0.0129
Isopentane	0.1247	0.5086	0.2633
n-Pentane	0.0550	0.2245	0.1150
2,2-Dimethylbutane	0.0079	0.0386	0.0191
2,3-Dimethylbutane	0.0092	0.0449	0.0218
2-Methylpentane	0.0279	0.1360	0.0668
3-Methylpentane	0.0189	0.0920	0.0444
n-Hexane	0.0227	0.1107	0.0539
Heptanes	0.0866	0.4421	0.1822
Octanes	0.0039	0.0254	0.0115
Nonanes	0.0034	0.0210	0.0080
Decanes plus	0.0000	0.0000	0.0000
Nitrogen	0.9408	1.4899	0.5949
Carbon Dioxide	2.1339	5.3095	2.0977
Oxygen	ND	ND	ND
Hydrogen Sulfide	ND	ND	ND
Total	100.0000	100.0000	100.0000

Calculated Global Properties	Units	
Gross BTU/Real CF	1033.7	BTU/SCF at 60°F and 14.73 psia
Sat.Gross BTU/Real CF	1016.9	BTU/SCF at 60°F and 14.73 psia
Gas Compressibility (Z)	0.9977	
Specific Gravity	0.6126	air=1
Avg Molecular Weight	17.688	gm/mole
Propane GPM	0.170549	gal/MCF
Butane GPM	0.135075	gal/MCF
Gasoline GPM	0.135126	gal/MCF
26# Gasoline GPM	0.186639	gal/MCF
Total GPM	1.572150	gal/MCF
Base Mol%	99.357	%v/v

H2S detection limit 100 ppm (+/-)

Component	Mol%	Wt%	LV%
Benzene	0.0230	0.1017	0.0372
Toluene	0.0125	0.0651	0.0241
Ethylbenzene	0.0004	0.0024	0.0009
M&P Xylene	0.0018	0.0107	0.0040
O-Xylene	0.0008	0.0048	0.0017
2,2,4-Trimethylpentane	0.0013	0.0083	0.0037
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0082	0.0392	0.0162
Methylcyclohexane	0.0092	0.0508	0.0212
Description:	FR before contactor and dehy		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	2.1339	5.3095	2.0977
Hydrogen Sulfide	ND	ND	ND
Nitrogen	0.9408	1.4899	0.5949
Methane	93.0343	84.3812	90.9005
Ethane	2.4829	4.2210	3.8381
Propane	0.6223	1.5513	0.9890
Isobutane	0.2567	0.8436	0.4844
n-Butane	0.1689	0.5359	0.2965
Isopentane	0.1247	0.5324	0.2762
n-Pentane	0.0550	0.2245	0.1150
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0227	0.1107	0.0539
Cyclohexane	0.0082	0.0392	0.0162
Other Hexanes	0.0639	0.3115	0.1521
Heptanes	0.0324	0.1770	0.0798
Methylcyclohexane	0.0092	0.0508	0.0212
2,2,4 Trimethylpentane	0.0013	0.0083	0.0037
Benzene	0.0230	0.1017	0.0372
Toluene	0.0125	0.0651	0.0241
Ethylbenzene	0.0004	0.0024	0.0009
Xylenes	0.0026	0.0155	0.0057
C8+ Heavies	0.0043	0.0285	0.0129
Subtotal	100.0000	100.0000	100.0000
Oxygen	ND	ND	ND
Total	100.0000	100.0000	100.0000

Liquids Analysis (storage tanks)

QUESTAR ENERGY SERVICES

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

Analysis for
ProMax Input

LIMS ID:	N/A	Description:	Flat Rock Inlet Scrubber
Analysis Date/Time:	10/23/2017 1:58 PM	Field:	Flat Rock
Analyst Initials:	BMB	ML#:	Andeavor
Sample Temperature:	66	GC Method:	Quesliq GPA 2186
Sample Pressure:	120	Data File:	QPC17.D
Date Sampled:	10/19/2017	Instrument ID:	1

Component	Mol%	Wt%	LV%
Methane	2.9235	0.4202	1.0377
Ethane	0.4927	0.1327	0.2760
Propane	0.4330	0.1710	0.2499
Isobutane	0.4419	0.2301	0.3029
n-Butane	0.4397	0.2289	0.2904
Neopentane	0.0390	0.0252	0.0313
Isopentane	0.9945	0.6428	0.7619
n-Pentane	0.6592	0.4260	0.5005
2,2-Dimethylbutane	0.2294	0.1771	0.2006
2,3-Dimethylbutane	0.3814	0.2944	0.3274
2-Methylpentane	1.3520	1.0438	1.1756
3-Methylpentane	0.9184	0.7090	0.7852
n-Hexane	1.6687	1.2883	1.4374
Heptanes	16.1402	13.8300	13.7495
Octanes	21.2825	20.1425	19.6417
Nonanes	30.0444	32.1521	31.0065
Decanes plus	21.3994	28.0233	28.1685
Nitrogen	0.0049	0.0012	0.0011
Carbon Dioxide	0.1564	0.0616	0.0559
Total	100.0000	100.0000	100.0000

Calculated Global Properties

Units

Avg Molecular Weight	111.6285 gm/mole
Pseudocritical Pressure	425.28 psia
Pseudocritical Temperature	565.91 degF
Specific Gravity	0.74095 gm/ml
Liquid Density	6.1790 lb/gal
Liquid Density	259.52 lb/bbl
Specific Gravity	3.3658 air=1
SCF/bbl	885.25 SCF/bbl
SCF/gal	21.0774 SCF/gal
MCF/gal	0.0211 MCF/gal
gal/MCF	47.469 gal/MCF
Net Heating Value	5468.4 BTU/SCF at 60°F
Net Heating Value	18399.3 BTU/lb at 60°F
Gross Heating Value	5875.7 BTU/SCF at 60°F
Gross Heating Value	19834.5 BTU/lb at 60°F
Gross Heating Value	123455.5 BTU/gal at 60°F
API Gravity	59.5
MON	68.7
RON	71.2
TVP	154.911 psia

Component	Mol%	Wt%	LV%
-----------	------	-----	-----

Benzene	2.7740	1.9412	1.6260
Toluene	8.2397	6.8014	5.7798
Ethylbenzene	1.1960	1.1375	0.9668
M&P Xylene	8.8191	8.3878	7.1534
O-Xylene	1.9495	1.8541	1.5529
2,2,4-Trimethylpentane	0.4340	0.4442	0.4569

Data File: Flat Rock Inlet Scrubber

Page #2

GRI E&P TANK INFORMATION

Component	Mol%	Wt%	LV%
H2S	ND	ND	ND
O2	ND	ND	ND
CO2	0.1564	0.0616	0.0559
N2	0.0049	0.0012	0.0011
C1	2.9235	0.4202	1.0377
C2	0.4927	0.1327	0.2760
C3	0.4330	0.1710	0.2499
IC4	0.4419	0.2301	0.3029
NC4	0.4787	0.2541	0.3217
IC5	0.9945	0.6428	0.7619
NC5	0.6592	0.4260	0.5005
Hexanes	2.8812	2.2243	2.4888
Heptanes	13.3662	11.8888	12.1235
Octanes	12.6088	12.8969	13.4050
Nonanes	18.0798	20.7727	21.3334
Benzene	2.7740	1.9412	1.6260
Toluene	8.2397	6.8014	5.7798
E-Benzene	1.1960	1.1375	0.9668
Xylene	10.7686	10.2419	8.7063
n-C6	1.6687	1.2883	1.4374
2,2,4-Trimethylpentane	0.4340	0.4442	0.4569
C10 Plus			
C10 Mole %	21.3994	28.0233	28.1685
Molecular Wt.	146.8334		
Specific Gravity	0.7373		
Total	100.00	100.00	100.00

Fuel Gas Analysis

Gas Composition and Properties

Effective October 16, 2017 02:49 - January 18, 2038 21:14

Source #: 008042

Name: FLAT ROCK DISCHARGE TO FR MESA
PIPELINE

Component	Mole %	Liquid Content	Mass %
Carbon Dioxide, CO2	2.0638		5.0811
Nitrogen, N2	1.0748		1.6844
Methane, C1	92.6875		83.1827
Ethane, C2	2.5129	0.6734	4.2270
Propane, C3	0.6176	0.1705	1.5235
iso-Butane, iC4	0.3169	0.1039	1.0304
n-Butane, nC4	0.1847	0.0583	0.6005
iso-Pentane, iC5	0.1473	0.0540	0.5945
n-Pentane, nC5	0.0676	0.0246	0.2728
Neo-Pentane, NeoC5			
Hexanes, C6	0.1251	0.0516	0.6031
Heptanes, C7	0.1191	0.0551	0.6676
Octanes, C8	0.0777	0.0399	0.4965
Nonanes Plus, C9+	0.0050	0.0028	0.0359
Water, H2O			
Hydrogen Sulfide, H2S			
Oxygen, O2			
Carbon Monoxide, CO			
Hydrogen, H2			
Helium, He			
Argon, Ar			

Property	Total Sample	C9 Plus Fraction
----------	--------------	------------------

Pressure Base	14.730	
Temperature Base	60.00	
HCDP @ Sample Pressure		
Cricondentherm		
HV, Dry @ Base P, T	1043.61	
HV, Sat @ Base P, T	1025.45	
HV, Sat @ Sample P, T	1042.87	
Relative Density	0.6184	

Totals	100.0000	1.2340	100.0000
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Sample

Date: 10/16/2017 Pressure: 941.0
 Type: Spot Temperature: 89.0
 Tech: Deters H2O: lbs/mm
 H2S: ppm

Remarks:

Analysis

Date: 10/16/2017 Instrument:
 Cylinder:
 Tech:

Remarks:

GLYCalc Report

(dehydrator modeling)

View this product on Kimray.com

GAB1 4020 PV GLYCOL PUMP- VITON

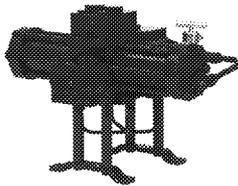
Glycol Pump | Energy Exchange Glycol
Pump

Pressure to Volume - Standard Cylinder

Operation: Pneumatic

Options Included In This Model:

- Elastomer: FKM



By exchanging the energy contained in the contact tower gas pressure with the volume flow of the glycol, this pump needs no external energy source outside of the closed loop dehydration system to operate.

Specifications

Body Material: **Steel**
Max. Working Pressure: **2000 psig**
Min. Operating Pressure: **300 psig**
Operation: **Pneumatic**
Catalog Page: **G:10.17**
Min. Flow Rate: **12 gph**
Max. Flow Rate: **40 gph**
Repair Kit P/N: **RJB1-V**

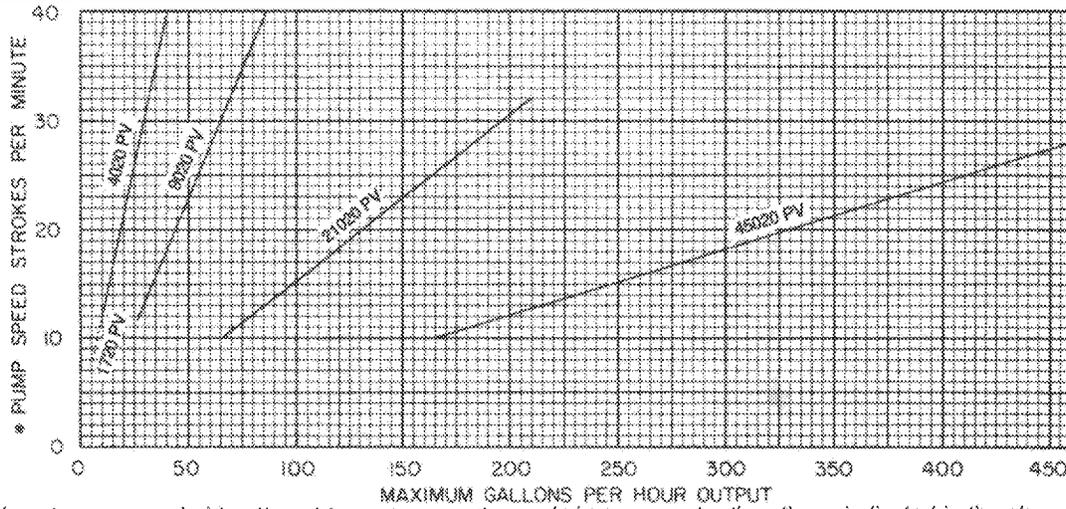
GLYCOL PUMPS



"PV" & "SC" SERIES CHARTS & DIMENSIONS

Model Number	Max. Cap		Size of Pipe Connections	Mounting Bolts	Approx. Weight	Max. Strokes Minute	Glycol Output Strokes/Gal.	Glycol Output Gal./Strokes
	G.P.M.	G.P.H.						
1715 PV	.67	40	1/2" N.P.T.	3/8" Dia.	66 Lbs.	40	59	0.017
4020 PV	.67	40	1/2" N.P.T.	3/8" Dia.	66 Lbs.	40	59	0.017
9020 PV	1.5	90	3/4" N.P.T.	1/2" Dia.	119 Lbs.	40	26.3	0.038
21020 PV	3.5	210	1" N.P.T.	1/2" Dia.	215 Lbs.	32	9	0.111
45020 PV	7.5	450	1 1/2" N.P.T.	1/2" Dia.	500 Lbs.	28	3.5	0.283
2015 SC	.33	20	1/2" N.P.T.	3/8" Dia.	66 Lbs.	55	147	0.0068
5015 SC	.83	50	3/4" N.P.T.	1/2" Dia.	119 Lbs.	50	52	0.019
10015 SC	1.67	100	1" N.P.T.	1/2" Dia.	215 Lbs.	48	25	0.040
20015SC	3.33	200	1 1/2" N.P.T.	1/2" Dia.	500 Lbs.	40	8.8	0.114

CIRCULATION RATE GRAPH

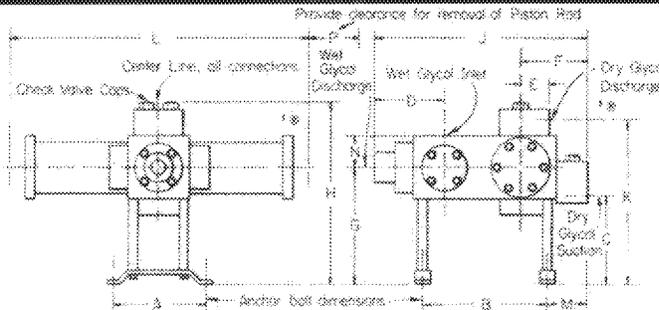


* It is not recommended to attempt to run pumps at speeds less or greater than those indicated in the above graph.

GAS CONSUMPTION

Operating Pressure -p.s.i.g.	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
Cut. Ft./Gallon @ 14.4 & 60°F.	1.7	2.3	2.8	3.4	3.9	4.5	5.0	5.6	6.1	6.7	7.2	7.9	8.3

DIMENSIONS



Model Number "PV" Series "SC" Series	Dimensions, Inches													
	A	B	C	D	E	F	G	H	J	K	L	M	N	P
1720 PV	5 1/4	5 11/16	5 3/4	3 7/16	1 1/2	3 1/2	7 1/4	10 7/8	10 3/16	9 5/8	15	2 1/8	1 3/4	3
4020 PV & 2015 SC	5 1/4	5 11/16	5 3/4	3 7/16	1 1/2	3 1/2	7 1/4	10 7/8	10 3/16	9 5/8	15	2 1/8	1 3/4	3
9020 PV & 5015 SC	6 1/4	8 1/4 ± 1/8	6 3/8	5	1 3/4	4 1/4	8 3/4	13 1/4	13 7/8	11 3/4	20	2 1/2	2	3
21020 PV & 10015 SC	7 5/8	10 1/8 ± 1/8	7	5 3/8	2 1/4	5 3/4	9 1/4	14 3/4	16 5/8	13	24	3 3/16	2 1/2	4
45020 PV & 20015 SC	10 3/4	14 ± 1/8	9	6 5/8	2 5/8	6 1/2	11 3/8	19	21 1/8	16 3/8	34	3 3/4	3 1/2	6

G:10.8
Issued 1/13

† Configuration of Glycol pump is a trademark of Kimray, Inc.
www.kimray.com

Current Revision:
Change Logo

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Flat Rock CS - 9.3 MMscfd Allowable Emissions
 File Name: \\DELOGF01\Departments\EHS\UTAH_02 Facilities\Flat Rock_added
 2016-10-31\Air\02 Permit Applications\FIP Part 2\Dehy\20180221 Flat Rock
 CS_dehy_Composite FR Analysis_Kimray 4020PV_1000 psig_80degF_9.3MMscfd.ddf
 Date: February 21, 2018

DESCRIPTION:

 Description: Analysis from Flat Rock dehy inlet gas
 (12/6-12/29)
 9.3-MMscfd design production rate, condenser
 120
 Kimray 4020PV design circulation (0.67
 gpm)
 7 lb/MMscf H2O outlet; inlet 1000 psig, 80
 degF

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

 Temperature: 80.00 deg. F
 Pressure: 1000.00 psig
 Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	2.1447
Nitrogen	1.0080
Methane	92.8826
Ethane	2.5341
Propane	0.6466
Isobutane	0.2637
n-Butane	0.1771
Isopentane	0.1272
n-Pentane	0.0567
n-Hexane	0.0215
Cyclohexane	0.0072
Other Hexanes	0.0614
Heptanes	0.0285
Methylcyclohexane	0.0073
2,2,4-Trimethylpentane	0.0011
Benzene	0.0204
Toluene	0.0084
Ethylbenzene	0.0002
Xylenes	0.0010
C8+ Heavies	0.0025

DRY GAS:

 Flow Rate: 9.3 MMSCF/day
 Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 0.7 gpm

PUMP:

Glycol Pump Type: Electric/Pneumatic

FLASH TANK:

Flash Control: Recycle/recompression
Temperature: 75.0 deg. F
Pressure: 45.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Condenser
Temperature: 120.0 deg. F
Pressure: 11.1 psia

Control Device: Combustion Device
Destruction Efficiency: 95.0 %
Excess Oxygen: 10.0 %
Ambient Air Temperature: 46.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Flat Rock CS - 9.3 MMscfd Allowable Emissions
 File Name: \\DELOGF01\Departments\EHS\UTAH_02 Facilities\Flat Rock_added
 2016-10-31\Air\02 Permit Applications\FIP Part 2\Dehy\20180221 Flat Rock
 CS_dehy_Composite FR Analysis_Kimray 4020PV_1000 psig_80degF_9.3MMscfd.ddf
 Date: February 21, 2018

DESCRIPTION:

Description: Analysis from Flat Rock dehy inlet gas
 (12/6-12/29)
 9.3-MMscfd design production rate, condenser
 120
 Kimray 4020PV design circulation (0.67
 gpm)
 7 lb/MMscf H2O outlet; inlet 1000 psig, 80
 degF

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0032	0.076	0.0138
Ethane	0.0018	0.044	0.0080
Propane	0.0021	0.051	0.0093
Isobutane	0.0021	0.050	0.0092
n-Butane	0.0021	0.051	0.0093
Isopentane	0.0019	0.045	0.0081
n-Pentane	0.0011	0.027	0.0050
n-Hexane	0.0008	0.020	0.0036
Cyclohexane	0.0012	0.028	0.0051
Other Hexanes	0.0019	0.045	0.0081
Heptanes	0.0016	0.037	0.0068
Methylcyclohexane	0.0010	0.025	0.0046
2,2,4-Trimethylpentane	<0.0001	0.001	0.0001
Benzene	0.0279	0.670	0.1224
Toluene	0.0105	0.252	0.0459
Ethylbenzene	0.0002	0.004	0.0007
Xylenes	0.0008	0.018	0.0034
C8+ Heavies	<0.0001	<0.001	<0.0001
Total Emissions	0.0601	1.443	0.2634
Total Hydrocarbon Emissions	0.0601	1.443	0.2634
Total VOC Emissions	0.0552	1.324	0.2416
Total HAP Emissions	0.0402	0.965	0.1760
Total BTEX Emissions	0.0393	0.944	0.1723

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0632	1.518	0.2770
Ethane	0.0366	0.879	0.1604

Propane	0.0434	1.041	0.1900
Isobutane	0.0437	1.048	0.1913
n-Butane	0.0452	1.086	0.1981
Isopentane	0.0429	1.031	0.1881
n-Pentane	0.0273	0.656	0.1196
n-Hexane	0.0238	0.572	0.1043
Cyclohexane	0.0398	0.955	0.1744
Other Hexanes	0.0486	1.167	0.2130
Heptanes	0.0727	1.746	0.3186
Methylcyclohexane	0.0507	1.217	0.2222
2,2,4-Trimethylpentane	0.0012	0.028	0.0051
Benzene	1.0844	26.025	4.7496
Toluene	0.7792	18.700	3.4128
Ethylbenzene	0.0265	0.635	0.1159
Xylenes	0.1858	4.460	0.8140
C8+ Heavies	0.0226	0.542	0.0989

Total Emissions	2.6377	63.306	11.5533
Total Hydrocarbon Emissions	2.6377	63.306	11.5533
Total VOC Emissions	2.5379	60.909	11.1159
Total HAP Emissions	2.1008	50.420	9.2017
Total BTEX Emissions	2.0759	49.821	9.0922

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.1043	26.504	4.8370
Ethane	0.1524	3.657	0.6674
Propane	0.0693	1.664	0.3036
Isobutane	0.0403	0.967	0.1765
n-Butane	0.0297	0.712	0.1299
Isopentane	0.0222	0.533	0.0972
n-Pentane	0.0108	0.259	0.0472
n-Hexane	0.0045	0.108	0.0197
Cyclohexane	0.0019	0.046	0.0084
Other Hexanes	0.0128	0.306	0.0559
Heptanes	0.0058	0.139	0.0253
Methylcyclohexane	0.0017	0.041	0.0074
2,2,4-Trimethylpentane	0.0002	0.005	0.0009
Benzene	0.0052	0.125	0.0229
Toluene	0.0021	0.050	0.0092
Ethylbenzene	<0.0001	0.001	0.0002
Xylenes	0.0002	0.004	0.0007
C8+ Heavies	0.0003	0.006	0.0011

Total Emissions	1.4635	35.125	6.4103
Total Hydrocarbon Emissions	1.4635	35.125	6.4103
Total VOC Emissions	0.2068	4.964	0.9060
Total HAP Emissions	0.0122	0.293	0.0535
Total BTEX Emissions	0.0075	0.180	0.0329

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0032	0.076	0.0138
Ethane	0.0018	0.044	0.0080
Propane	0.0021	0.051	0.0093
Isobutane	0.0021	0.050	0.0092
n-Butane	0.0021	0.051	0.0093
Isopentane	0.0019	0.045	0.0081
n-Pentane	0.0011	0.027	0.0050
n-Hexane	0.0008	0.020	0.0036
Cyclohexane	0.0012	0.028	0.0051
Other Hexanes	0.0019	0.045	0.0081
Heptanes	0.0016	0.037	0.0068
Methylcyclohexane	0.0010	0.025	0.0046
2,2,4-Trimethylpentane	<0.0001	0.001	0.0001
Benzene	0.0279	0.670	0.1224
Toluene	0.0105	0.252	0.0459
Ethylbenzene	0.0002	0.004	0.0007
Xylenes	0.0008	0.018	0.0034
C8+ Heavies	<0.0001	<0.001	<0.0001
Total Emissions	0.0601	1.443	0.2634
Total Hydrocarbon Emissions	0.0601	1.443	0.2634
Total VOC Emissions	0.0552	1.324	0.2416
Total HAP Emissions	0.0402	0.965	0.1760
Total BTEX Emissions	0.0393	0.944	0.1723

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	5.1140	0.0138	99.73
Ethane	0.8277	0.0080	99.04
Propane	0.4936	0.0093	98.11
Isobutane	0.3677	0.0092	97.50
n-Butane	0.3280	0.0093	97.16
Isopentane	0.2853	0.0081	97.15
n-Pentane	0.1669	0.0050	97.03
n-Hexane	0.1240	0.0036	97.10
Cyclohexane	0.1828	0.0051	97.19
Other Hexanes	0.2689	0.0081	96.97
Heptanes	0.3439	0.0068	98.03
Methylcyclohexane	0.2296	0.0046	98.00
2,2,4-Trimethylpentane	0.0060	0.0001	98.12
Benzene	4.7725	0.1224	97.44
Toluene	3.4219	0.0459	98.66
Ethylbenzene	0.1160	0.0007	99.43
Xylenes	0.8147	0.0034	99.59
C8+ Heavies	<0.0001	<0.0001	99.99
Total Emissions	17.9636	0.2634	98.53
Total Hydrocarbon Emissions	17.9636	0.2634	98.53
Total VOC Emissions	12.0219	0.2416	97.99

Total HAP Emissions	9.2552	0.1760	98.10
Total BTEX Emissions	9.1252	0.1723	98.11

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature: 120.00 deg. F
 Condenser Pressure: 11.10 psia
 Condenser Duty: 4.91e-003 MM BTU/hr
 Hydrocarbon Recovery: 0.11 bbls/day
 Produced Water: 0.80 bbls/day
 Ambient Temperature: 46.00 deg. F
 Excess Oxygen: 10.00 %
 Combustion Efficiency: 95.00 %
 Supplemental Fuel Requirement: 4.91e-003 MM BTU/hr

Component	Emitted	Destroyed
Methane	5.00%	95.00%
Ethane	4.98%	95.02%
Propane	4.90%	95.10%
Isobutane	4.80%	95.20%
n-Butane	4.71%	95.29%
Isopentane	4.32%	95.68%
n-Pentane	4.14%	95.86%
n-Hexane	3.44%	96.56%
Cyclohexane	2.95%	97.05%
Other Hexanes	3.82%	96.18%
Heptanes	2.13%	97.87%
Methylcyclohexane	2.07%	97.93%
2,2,4-Trimethylpentane	2.20%	97.80%
Benzene	2.58%	97.42%
Toluene	1.35%	98.65%
Ethylbenzene	0.57%	99.43%
Xylenes	0.41%	99.59%
C8+ Heavies	0.01%	99.99%

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages: 1.25
 Calculated Dry Gas Dew Point: 2.07 lbs. H2O/MMSCF

Temperature: 80.0 deg. F
 Pressure: 1000.0 psig
 Dry Gas Flow Rate: 9.3000 MMSCF/day
 Glycol Losses with Dry Gas: 0.0600 lb/hr
 Wet Gas Water Content: Saturated
 Calculated Wet Gas Water Content: 32.27 lbs. H2O/MMSCF
 Calculated Lean Glycol Recirc. Ratio: 3.43 gal/lb H2O

Remaining Absorbed

Component	in Dry Gas	in Glycol
Water	6.40%	93.60%
Carbon Dioxide	99.88%	0.12%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.98%	0.02%
Propane	99.96%	0.04%
Isobutane	99.95%	0.05%
n-Butane	99.93%	0.07%
Isopentane	99.93%	0.07%
n-Pentane	99.91%	0.09%
n-Hexane	99.85%	0.15%
Cyclohexane	99.33%	0.67%
Other Hexanes	99.89%	0.11%
Heptanes	99.73%	0.27%
Methylcyclohexane	99.28%	0.72%
2,2,4-Trimethylpentane	99.89%	0.11%
Benzene	93.30%	6.70%
Toluene	90.12%	9.88%
Ethylbenzene	87.78%	12.22%
Xylenes	82.84%	17.16%
C8+ Heavies	99.47%	0.53%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 75.0 deg. F
Flash Pressure: 45.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.99%	0.01%
Carbon Dioxide	50.97%	49.03%
Nitrogen	5.17%	94.83%
Methane	5.42%	94.58%
Ethane	19.37%	80.63%
Propane	38.50%	61.50%
Isobutane	52.02%	47.98%
n-Butane	60.39%	39.61%
Isopentane	66.09%	33.91%
n-Pentane	71.85%	28.15%
n-Hexane	84.23%	15.77%
Cyclohexane	95.55%	4.45%
Other Hexanes	79.43%	20.57%
Heptanes	92.68%	7.32%
Methylcyclohexane	96.91%	3.09%
2,2,4-Trimethylpentane	85.53%	14.47%
Benzene	99.54%	0.46%
Toluene	99.75%	0.25%
Ethylbenzene	99.88%	0.12%
Xylenes	99.92%	0.08%
C8+ Heavies	99.00%	1.00%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	32.56%	67.44%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.76%	99.24%
n-Pentane	0.70%	99.30%
n-Hexane	0.59%	99.41%
Cyclohexane	3.35%	96.65%
Other Hexanes	1.26%	98.74%
Heptanes	0.54%	99.46%
Methylcyclohexane	4.13%	95.87%
2,2,4-Trimethylpentane	1.75%	98.25%
Benzene	5.02%	94.98%
Toluene	7.92%	92.08%
Ethylbenzene	10.43%	89.57%
Xylenes	12.95%	87.05%
C8+ Heavies	12.16%	87.84%

STREAM REPORTS:

WET GAS STREAM

Temperature: 80.00 deg. F
 Pressure: 1014.70 psia
 Flow Rate: 3.88e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.80e-002	1.25e+001
Carbon Dioxide	2.14e+000	9.64e+002
Nitrogen	1.01e+000	2.88e+002
Methane	9.28e+001	1.52e+004
Ethane	2.53e+000	7.78e+002
Propane	6.46e-001	2.91e+002
Isobutane	2.64e-001	1.57e+002
n-Butane	1.77e-001	1.05e+002
Isopentane	1.27e-001	9.37e+001
n-Pentane	5.67e-002	4.18e+001
n-Hexane	2.15e-002	1.89e+001
Cyclohexane	7.20e-003	6.19e+000
Other Hexanes	6.14e-002	5.40e+001
Heptanes	2.85e-002	2.92e+001
Methylcyclohexane	7.30e-003	7.32e+000
2,2,4-Trimethylpentane	1.10e-003	1.28e+000
Benzene	2.04e-002	1.63e+001
Toluene	8.39e-003	7.91e+000

Ethylbenzene	2.00e-004	2.17e-001
Xylenes	9.99e-004	1.08e+000
C8+ Heavies	2.50e-003	4.35e+000

Total Components	100.00	1.81e+004

DRY GAS STREAM

Temperature: 80.00 deg. F
 Pressure: 1014.70 psia
 Flow Rate: 3.88e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	4.36e-003	8.02e-001
Carbon Dioxide	2.14e+000	9.63e+002
Nitrogen	1.01e+000	2.88e+002
Methane	9.29e+001	1.52e+004
Ethane	2.53e+000	7.78e+002
Propane	6.46e-001	2.91e+002
Isobutane	2.64e-001	1.56e+002
n-Butane	1.77e-001	1.05e+002
Isopentane	1.27e-001	9.37e+001
n-Pentane	5.67e-002	4.17e+001
n-Hexane	2.15e-002	1.89e+001
Cyclohexane	7.15e-003	6.15e+000
Other Hexanes	6.13e-002	5.40e+001
Heptanes	2.84e-002	2.91e+001
Methylcyclohexane	7.25e-003	7.27e+000
2,2,4-Trimethylpentane	1.10e-003	1.28e+000
Benzene	1.90e-002	1.52e+001
Toluene	7.57e-003	7.12e+000
Ethylbenzene	1.76e-004	1.90e-001
Xylenes	8.28e-004	8.98e-001
C8+ Heavies	2.49e-003	4.33e+000

Total Components	100.00	1.81e+004

LEAN GLYCOL STREAM

Temperature: 80.00 deg. F
 Flow Rate: 6.70e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)

TEG	9.85e+001	3.71e+002
Water	1.50e+000	5.66e+000
Carbon Dioxide	2.98e-011	1.12e-010
Nitrogen	6.73e-013	2.54e-012
Methane	1.04e-017	3.92e-017
Ethane	2.37e-008	8.92e-008
Propane	1.22e-009	4.59e-009
Isobutane	6.68e-010	2.52e-009
n-Butane	4.93e-010	1.86e-009
Isopentane	8.68e-005	3.27e-004
n-Pentane	5.08e-005	1.91e-004
n-Hexane	3.77e-005	1.42e-004

Cyclohexane	3.66e-004	1.38e-003
Other Hexanes	1.64e-004	6.20e-004
Heptanes	1.05e-004	3.95e-004
Methylcyclohexane	5.79e-004	2.18e-003
2,2,4-Trimethylpentane	5.56e-006	2.10e-005
Benzene	1.52e-002	5.74e-002
Toluene	1.78e-002	6.71e-002
Ethylbenzene	8.17e-004	3.08e-003
Xylenes	7.33e-003	2.76e-002
C8+ Heavies	8.29e-004	3.13e-003

Total Components	100.00	3.77e+002

RICH GLYCOL STREAM

 Temperature: 80.00 deg. F
 Pressure: 1014.70 psia
 Flow Rate: 7.04e-001 gpm
 NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)

TEG	9.42e+001	3.71e+002
Water	4.41e+000	1.74e+001
Carbon Dioxide	2.85e-001	1.12e+000
Nitrogen	6.43e-003	2.53e-002
Methane	2.96e-001	1.17e+000
Ethane	4.80e-002	1.89e-001
Propane	2.86e-002	1.13e-001
Isobutane	2.13e-002	8.40e-002
n-Butane	1.90e-002	7.49e-002
Isopentane	1.66e-002	6.55e-002
n-Pentane	9.72e-003	3.83e-002
n-Hexane	7.22e-003	2.84e-002
Cyclohexane	1.09e-002	4.31e-002
Other Hexanes	1.57e-002	6.20e-002
Heptanes	2.00e-002	7.89e-002
Methylcyclohexane	1.39e-002	5.46e-002
2,2,4-Trimethylpentane	3.55e-004	1.40e-003
Benzene	2.91e-001	1.15e+000
Toluene	2.15e-001	8.48e-001
Ethylbenzene	7.51e-003	2.96e-002
Xylenes	5.42e-002	2.14e-001
C8+ Heavies	6.59e-003	2.60e-002

Total Components	100.00	3.94e+002

FLASH TANK OFF GAS STREAM

 Temperature: 75.00 deg. F
 Pressure: 59.70 psia
 Flow Rate: 3.45e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	7.21e-002	1.18e-003
Carbon Dioxide	1.37e+001	5.50e-001
Nitrogen	9.43e-001	2.40e-002

Methane	7.57e+001	1.10e+000
Ethane	5.57e+000	1.52e-001
Propane	1.73e+000	6.93e-002
Isobutane	7.62e-001	4.03e-002
n-Butane	5.61e-001	2.97e-002
Isopentane	3.38e-001	2.22e-002
n-Pentane	1.64e-001	1.08e-002
n-Hexane	5.72e-002	4.49e-003
Cyclohexane	2.50e-002	1.92e-003
Other Hexanes	1.63e-001	1.28e-002
Heptanes	6.34e-002	5.77e-003
Methylcyclohexane	1.89e-002	1.69e-003
2,2,4-Trimethylpentane	1.95e-003	2.02e-004
Benzene	7.36e-002	5.23e-003
Toluene	2.49e-002	2.09e-003
Ethylbenzene	3.70e-004	3.57e-005
Xylenes	1.68e-003	1.62e-004
C8+ Heavies	1.67e-003	2.59e-004

Total Components	100.00	2.04e+000

FLASH TANK GLYCOL STREAM

Temperature: 75.00 deg. F
Flow Rate: 7.00e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.47e+001	3.71e+002
Water	4.43e+000	1.74e+001
Carbon Dioxide	1.46e-001	5.72e-001
Nitrogen	3.34e-004	1.31e-003
Methane	1.61e-002	6.32e-002
Ethane	9.34e-003	3.66e-002
Propane	1.11e-002	4.34e-002
Isobutane	1.11e-002	4.37e-002
n-Butane	1.15e-002	4.52e-002
Isopentane	1.10e-002	4.33e-002
n-Pentane	7.02e-003	2.75e-002
n-Hexane	6.11e-003	2.40e-002
Cyclohexane	1.05e-002	4.12e-002
Other Hexanes	1.26e-002	4.93e-002
Heptanes	1.87e-002	7.31e-002
Methylcyclohexane	1.35e-002	5.29e-002
2,2,4-Trimethylpentane	3.05e-004	1.20e-003
Benzene	2.91e-001	1.14e+000
Toluene	2.16e-001	8.46e-001
Ethylbenzene	7.54e-003	2.95e-002
Xylenes	5.45e-002	2.13e-001
C8+ Heavies	6.56e-003	2.57e-002

Total Components	100.00	3.92e+002

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
 Pressure: 14.70 psia
 Flow Rate: 2.65e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.30e+001	1.17e+001
Carbon Dioxide	1.86e+000	5.72e-001
Nitrogen	6.69e-003	1.31e-003
Methane	5.64e-001	6.32e-002
Ethane	1.74e-001	3.66e-002
Propane	1.41e-001	4.34e-002
Isobutane	1.07e-001	4.37e-002
n-Butane	1.11e-001	4.52e-002
Isopentane	8.51e-002	4.29e-002
n-Pentane	5.42e-002	2.73e-002
n-Hexane	3.95e-002	2.38e-002
Cyclohexane	6.77e-002	3.98e-002
Other Hexanes	8.07e-002	4.86e-002
Heptanes	1.04e-001	7.27e-002
Methylcyclohexane	7.39e-002	5.07e-002
2,2,4-Trimethylpentane	1.47e-003	1.17e-003
Benzene	1.99e+000	1.08e+000
Toluene	1.21e+000	7.79e-001
Ethylbenzene	3.56e-002	2.65e-002
Xylenes	2.50e-001	1.86e-001
C8+ Heavies	1.90e-002	2.26e-002
Total Components	100.00	1.49e+001

CONDENSER PRODUCED WATER STREAM

Temperature: 120.00 deg. F
 Flow Rate: 2.32e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	9.99e+001	1.16e+001	998505.
Carbon Dioxide	2.24e-002	2.60e-003	224.
Nitrogen	1.34e-006	1.56e-007	0.
Methane	1.25e-004	1.46e-005	1.
Ethane	8.25e-005	9.59e-006	1.
Propane	9.97e-005	1.16e-005	1.
Isobutane	5.37e-005	6.24e-006	1.
n-Butane	7.26e-005	8.44e-006	1.
Isopentane	4.46e-005	5.18e-006	0.
n-Pentane	2.92e-005	3.39e-006	0.
n-Hexane	1.76e-005	2.04e-006	0.
Cyclohexane	1.41e-004	1.64e-005	1.
Other Hexanes	3.21e-005	3.73e-006	0.
Heptanes	1.85e-005	2.14e-006	0.
Methylcyclohexane	6.05e-005	7.03e-006	1.

2,2,4-Trimethylpentane	2.06e-007	2.39e-008	0.
Benzene	9.45e-002	1.10e-002	945.
Toluene	2.93e-002	3.40e-003	293.
Ethylbenzene	3.20e-004	3.72e-005	3.
Xylenes	2.25e-003	2.62e-004	23.
C8+ Heavies	1.63e-008	1.89e-009	0.

Total Components	100.00	1.16e+001	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 120.00 deg. F
Flow Rate: 3.34e-003 gpm

Component	Conc. (wt%)	Loading (lb/hr)

Water	6.62e-002	9.42e-004
Carbon Dioxide	1.07e-001	1.52e-003
Nitrogen	2.22e-004	3.16e-006
Methane	3.08e-003	4.38e-005
Ethane	1.07e-002	1.52e-004
Propane	6.18e-002	8.79e-004
Isobutane	1.23e-001	1.75e-003
n-Butane	1.86e-001	2.64e-003
Isopentane	4.08e-001	5.80e-003
n-Pentane	3.29e-001	4.68e-003
n-Hexane	5.21e-001	7.41e-003
Cyclohexane	1.15e+000	1.63e-002
Other Hexanes	8.04e-001	1.14e-002
Heptanes	2.93e+000	4.17e-002
Methylcyclohexane	2.09e+000	2.97e-002
2,2,4-Trimethylpentane	4.62e-002	6.58e-004
Benzene	3.62e+001	5.15e-001
Toluene	3.98e+001	5.66e-001
Ethylbenzene	1.64e+000	2.34e-002
Xylenes	1.20e+001	1.70e-001
C8+ Heavies	1.58e+000	2.25e-002

Total Components	100.00	1.42e+000

CONDENSER VENT STREAM

Temperature: 120.00 deg. F
Pressure: 11.10 psia
Flow Rate: 1.45e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	1.54e+001	1.06e-001
Carbon Dioxide	3.37e+001	5.68e-001
Nitrogen	1.22e-001	1.31e-003
Methane	1.03e+001	6.32e-002
Ethane	3.17e+000	3.65e-002
Propane	2.52e+000	4.25e-002
Isobutane	1.89e+000	4.19e-002
n-Butane	1.92e+000	4.26e-002
Isopentane	1.35e+000	3.71e-002

n-Pentane	8.20e-001	2.26e-002
n-Hexane	4.98e-001	1.64e-002
Cyclohexane	7.29e-001	2.35e-002
Other Hexanes	1.13e+000	3.72e-002
Heptanes	8.09e-001	3.10e-002
Methylcyclohexane	5.59e-001	2.10e-002
2,2,4-Trimethylpentane	1.18e-002	5.17e-004
Benzene	1.87e+001	5.59e-001
Toluene	5.95e+000	2.10e-001
Ethylbenzene	7.47e-002	3.03e-003
Xylenes	3.80e-001	1.54e-002
C8+ Heavies	6.59e-004	4.29e-005

Total Components	100.00	1.88e+000

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
 Pressure: 14.70 psia
 Flow Rate: 3.69e-001 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Methane	2.03e+001	3.16e-003
Ethane	6.24e+000	1.82e-003
Propane	4.96e+000	2.12e-003
Isobutane	3.71e+000	2.10e-003
n-Butane	3.77e+000	2.13e-003
Isopentane	2.65e+000	1.86e-003
n-Pentane	1.61e+000	1.13e-003
n-Hexane	9.80e-001	8.20e-004
Cyclohexane	1.43e+000	1.17e-003
Other Hexanes	2.22e+000	1.86e-003
Heptanes	1.59e+000	1.55e-003
Methylcyclohexane	1.10e+000	1.05e-003
2,2,4-Trimethylpentane	2.33e-002	2.59e-005
Benzene	3.68e+001	2.79e-002
Toluene	1.17e+001	1.05e-002
Ethylbenzene	1.47e-001	1.52e-004
Xylenes	7.47e-001	7.71e-004
C8+ Heavies	1.30e-003	2.15e-006

Total Components	100.00	6.01e-002

ANNUAL AIR-COOLED CONDENSER PERFORMANCE:

ANNUAL AIR-COOLED CONDENSER PERFORMANCE

Nearest Site for Air Temperature Data: Salt Lake City, UT

Ambient Air Dry Bulb Temperature (deg. F)	Frequency (%)	Condenser Outlet Temperature (deg. F)
<=50	48.73	<=70
51-55	7.73	71-75
56-60	7.33	76-80
61-65	7.32	81-85

66-70	7.08	86-90
71-75	6.42	91-95
76-80	5.27	96-100
81-85	4.11	101-105
86-90	3.19	106-110
91-95	2.06	111-115
96-100	0.71	116-120
>100	0.06	>120

Condenser outlet temperature approach to ambient: 20.00 deg. F

Annual air-cooled condenser emissions and control efficiency:

	Uncontrolled emissions tons/year	Controlled emissions tons/year	% Control
Benzene	4.580	0.728	84.12
BTEX	8.308	0.902	89.15
Total HAP	8.400	0.927	88.96
VOC	9.985	1.599	83.99

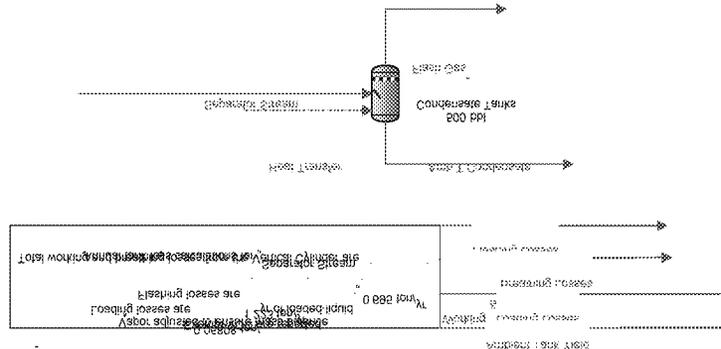
ProMax Report
(storage tank modeling)

Tank Losses at Ambient Temp Plant Schematic

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	
Flowsheet:	Tank Losses at Ambient Temp	

Flat Rock Compressor Station Condensate Tank Emissions

Names	Units	Separator Stream	Amb T Condensate	Ambient Tank Yield
Temperature	°F	66°	64.2	79.8°
Pressure	psia	134.7°	13.98	1.505
Std Liquid Volumetric Flow	bbld	10.12	10°	9.949



IK 310 IK 350

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
Stream: Amb T Condensate
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	Modified: 9:51 AM, 11/30/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 9:53 AM, 11/30/2017

Connections

From: 500-bbl Condensate Tanks

To: --

Composition

Mole Fraction	Total %	Light Liquid %			
CO2	0.0445992	0.0445992			
N2	0.000177845	0.000177845			
Methane	0.341718	0.341718			
Ethane	0.233089	0.233089			
Propane	0.34386	0.34386			
i-Butane	0.410676	0.410676			
n-Butane	0.460116	0.460116			
i-Pentane	1.00065	1.00065			
n-Pentane	0.668146	0.668146			
C6Alkanes(dibranched)	2.95206	2.95206			
n-Heptane	13.7974	13.7974			
n-Octane	13.0314	13.0314			
n-Nonane	18.692	18.692			
Benzene	2.85581	2.85581			
Toluene	8.5101	8.5101			
Ethylbenzene	1.23623	1.23623			
p-Xylene	11.131	11.131			
n-Hexane	1.71602	1.71602			
2,2,4-Trimethylpentane	0.447963	0.447963			
C10+	22.127	22.127			

Mass Fraction	Total %	Light Liquid %			
CO2	0.0139647	0.0139647			
N2	3.54457E-05	3.54457E-05			
Methane	0.0390028	0.0390028			
Ethane	0.0498653	0.0498653			
Propane	0.107878	0.107878			
i-Butane	0.169823	0.169823			
n-Butane	0.190268	0.190268			
i-Pentane	0.51365	0.51365			
n-Pentane	0.342971	0.342971			
C6Alkanes(dibranched)	1.80994	1.80994			
n-Heptane	9.83628	9.83628			
n-Octane	10.5907	10.5907			
n-Nonane	17.0563	17.0563			
Benzene	1.5871	1.5871			
Toluene	5.57869	5.57869			
Ethylbenzene	0.933766	0.933766			
p-Xylene	8.40758	8.40758			
n-Hexane	1.05211	1.05211			
2,2,4-Trimethylpentane	0.36406	0.36406			
C10+	41.356	41.356			

Mass Flow	Total lb/h	Light Liquid lb/h			
CO2	0.0161465	0.0161465			
N2	4.09839E-05	4.09839E-05			
Methane	0.0450967	0.0450967			
Ethane	0.0576564	0.0576564			
Propane	0.124734	0.124734			
i-Butane	0.196357	0.196357			
n-Butane	0.219996	0.219996			
i-Pentane	0.593904	0.593904			
n-Pentane	0.396557	0.396557			
C6Alkanes(dibranched)	2.09273	2.09273			

* User Specified Values
 ? Extrapolated or Approximate Values

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ED_004016P_00012965-00097

Process Streams Report
Stream: Amb T Condensate
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	Modified: 9:51 AM, 11/30/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 9:53 AM, 11/30/2017

Mass Flow	Total lb/h	Light Liquid lb/h			
n-Heptane	11.3731	11.3731			
n-Octane	12.2454	12.2454			
n-Nonane	19.7213	19.7213			
Benzene	1.83507	1.83507			
Toluene	6.45032	6.45032			
Ethylbenzene	1.07966	1.07966			
p-Xylene	9.72121	9.72121			
n-Hexane	1.2165	1.2165			
2,2,4-Trimethylpentane	0.420942	0.420942			
C10+	47.8176	47.8176			

Properties

Property	Units	Total	Light Liquid		
Temperature	°F	64.2	64.2		
Pressure	psia	13.98	13.98		
Mole Fraction Vapor	%	0	0		
Mole Fraction Light Liquid	%	100	100		
Mole Fraction Heavy Liquid	%	0	0		
Molecular Weight	lb/lbmol	140.554	140.554		
Mass Density	lb/ft^3	49.6091	49.6091		
Liquid Volumetric Flow	gpm	0.290582	0.290582		
Std Vapor Volumetric Flow	MMSCFD	0.00749222	0.00749222		
Std Liquid Volumetric Flow	bbl/d	10 *	10		
Compressibility		0.00704535	0.00704535		
Specific Gravity		0.795412	0.795412		
API Gravity		45.9738	45.9738		
Enthalpy	Btu/h	-84329.1	-84329.1		
Mass Enthalpy	Btu/lb	-729.337	-729.337		
Mass Cp	Btu/(lb*°F)	0.453871	0.453871		
Ideal Gas CpCv Ratio		1.04235	1.04235		
Dynamic Viscosity	cP	1.05728	1.05728		
Kinematic Viscosity	cSt	1.33048	1.33048		
Thermal Conductivity	Btu/(h*ft*°F)	0.0740256	0.0740256		
Surface Tension	lbf/ft	0.00185374 ?	0.00185374 ?		
Net Ideal Gas Heating Value	Btu/ft^3	6890.69	6890.69		
Net Liquid Heating Value	Btu/lb	18445.9	18445.9		
Gross Ideal Gas Heating Value	Btu/ft^3	7356.35	7356.35		
Gross Liquid Heating Value	Btu/lb	19703.2	19703.2		

Remarks

* User Specified Values
 ? Extrapolated or Approximate Values

Process Streams Report
Stream: Flash Gas
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	Modified: 2:02 PM, 12/29/2015
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 9:53 AM, 11/30/2017

Connections

From: 500-bbl Condensate Tanks

To: --

Composition

Mole Fraction	Total %	Vapor %		
CO2	3.44339	3.44339		
N2	0.143734	0.143734		
Methane	78.8291	78.8291		
Ethane	8.12531	8.12531		
Propane	3.05363	3.05363		
i-Butane	1.35975	1.35975		
n-Butane	1.02491	1.02491		
i-Pentane	0.813337	0.813337		
n-Pentane	0.395935	0.395935		
C6Alkanes(dibranched)	0.796896	0.796896		
n-Heptane	0.682593	0.682593		
n-Octane	0.178605	0.178605		
n-Nonane	0.0753169	0.0753169		
Benzene	0.367637	0.367637		
Toluene	0.286622	0.286622		
Ethylbenzene	0.0126696	0.0126696		
p-Xylene	0.110451	0.110451		
n-Hexane	0.276786	0.276786		
2,2,4-Trimethylpentane	0.0233088	0.0233088		
C10+	1.59882E-06	1.59882E-06		

Mass Fraction	Total %	Vapor %		
CO2	6.62667	6.62667		
N2	0.176071	0.176071		
Methane	55.2994	55.2994		
Ethane	10.6837	10.6837		
Propane	5.88809	5.88809		
i-Butane	3.45593	3.45593		
n-Butane	2.60489	2.60489		
i-Pentane	2.56604	2.56604		
n-Pentane	1.24915	1.24915		
C6Alkanes(dibranched)	3.00295	3.00295		
n-Heptane	2.9909	2.9909		
n-Octane	0.892139	0.892139		
n-Nonane	0.422406	0.422406		
Benzene	1.25574	1.25574		
Toluene	1.15482	1.15482		
Ethylbenzene	0.0588177	0.0588177		
p-Xylene	0.512762	0.512762		
n-Hexane	1.04301	1.04301		
2,2,4-Trimethylpentane	0.116428	0.116428		
C10+	1.83664E-05	1.83664E-05		

Mass Flow	Total ton/yr	Vapor ton/yr		
CO2	0.185717	0.185717		
N2	0.00493451	0.00493451		
Methane	1.5498	1.5498		
Ethane	0.299418	0.299418		
Propane	0.165018	0.165018		
i-Butane	0.0968548	0.0968548		
n-Butane	0.0730039	0.0730039		
i-Pentane	0.0719149	0.0719149		
n-Pentane	0.0350084	0.0350084		
C6Alkanes(dibranched)	0.0841596	0.0841596		

* User Specified Values
 ? Extrapolated or Approximate Values

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ED_004016P_00012965-00099

Process Streams Report
Stream: Flash Gas
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	Modified: 2:02 PM, 12/29/2015
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 9:53 AM, 11/30/2017

Mass Flow	Total ton/yr	Vapor ton/yr			
n-Heptane	0.0838219	0.0838219			
n-Octane	0.0250028	0.0250028			
n-Nonane	0.0118382	0.0118382			
Benzene	0.0351929	0.0351929			
Toluene	0.0323646	0.0323646			
Ethylbenzene	0.00164841	0.00164841			
p-Xylene	0.0143705	0.0143705			
n-Hexane	0.0292311	0.0292311			
2,2,4-Trimethylpentane	0.00326298	0.00326298			
C10+	5.14731E-07	5.14731E-07			

Properties

Property	Units	Total	Vapor		
Temperature	°F	64.2 *	64.2		
Pressure	psia	13.98 *	13.98		
Mole Fraction Vapor	%	100	100		
Mole Fraction Light Liquid	%	0	0		
Mole Fraction Heavy Liquid	%	0	0		
Molecular Weight	lb/lbmol	22.8685	22.8685		
Mass Density	lb/ft^3	0.057105	0.057105		
Liquid Volumetric Flow	gpm	1.39697	1.39697		
Std Vapor Volumetric Flow	MMSCFD	0.00025483	0.00025483		
Std Liquid Volumetric Flow	sgpm	0.00341355	0.00341355		
Compressibility		0.995825	0.995825		
Specific Gravity		0.789586	0.789586		
API Gravity					
Enthalpy	Btu/h	-1094.11	-1094.11		
Mass Enthalpy	Btu/lb	-1709.93	-1709.93		
Mass Cp	Btu/(lb*°F)	0.452694	0.452694		
Ideal Gas CpCv Ratio		1.23849	1.23849		
Dynamic Viscosity	cP	0.0104353	0.0104353		
Kinematic Viscosity	cSt	11.408	11.408		
Thermal Conductivity	Btu/(h*ft*°F)	0.0165505	0.0165505		
Surface Tension	lbf/ft				
Net Ideal Gas Heating Value	Btu/ft^3	1165.68	1165.68		
Net Liquid Heating Value	Btu/lb	19279.2	19279.2		
Gross Ideal Gas Heating Value	Btu/ft^3	1282.28	1282.28		
Gross Liquid Heating Value	Btu/lb	21214.1	21214.1		

Remarks

* User Specified Values
 ? Extrapolated or Approximate Values

Process Streams Report

Stream: Flashing Losses

Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	Modified: 10:13 AM, 11/30/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 9:53 AM, 11/30/2017

Connections

From: -- To: --

Composition

Mole Fraction	Total %	Vapor %
CO2	3.41576 *	3.41576
N2	0.133302 *	0.133302
Methane	74.4666 *	74.4666
Ethane	8.55953 *	8.55953
Propane	3.72003 *	3.72003
i-Butane	1.82176 *	1.82176
n-Butane	1.41559 *	1.41559
i-Pentane	1.19966 *	1.19966
n-Pentane	0.596683 *	0.596683
C6Alkanes(dibranched)	1.23691 *	1.23691
n-Heptane	1.16676 *	1.16676
n-Octane	0.324008 *	0.324008
n-Nonane	0.14502 *	0.14502
Benzene	0.594847 *	0.594847
Toluene	0.493034 *	0.493034
Ethylbenzene	0.0230502 *	0.0230502
p-Xylene	0.200186 *	0.200186
n-Hexane	0.447975 *	0.447975
2,2,4-Trimethylpentane	0.0393092 *	0.0393092
C10+	5.02481E-06 *	5.02481E-06

Mass Fraction	Total	Vapor
CO2	0.0595192 *	0.0595192
N2	0.00147852 *	0.00147852
Methane	0.472995 *	0.472995
Ethane	0.101904 *	0.101904
Propane	0.064948 *	0.064948
i-Butane	0.0419234 *	0.0419234
n-Butane	0.0325765 *	0.0325765
i-Pentane	0.0342698 *	0.0342698
n-Pentane	0.017045 *	0.017045
C6Alkanes(dibranched)	0.0422031 *	0.0422031
n-Heptane	0.0462893 *	0.0462893
n-Octane	0.0146539 *	0.0146539
n-Nonane	0.00736422 *	0.00736422
Benzene	0.0183969 *	0.0183969
Toluene	0.0179863 *	0.0179863
Ethylbenzene	0.0009689 *	0.0009689
p-Xylene	0.0084147 *	0.0084147
n-Hexane	0.0152848 *	0.0152848
2,2,4-Trimethylpentane	0.00177784 *	0.00177784
C10+	5.22642E-07 *	5.22642E-07

Mass Flow	Total ton/yr	Vapor ton/yr
CO2	0.199922 *	0.199922
N2	0.00496628 *	0.00496628
Methane	1.58877 *	1.58877
Ethane	0.342293 *	0.342293
Propane	0.218157 *	0.218157
i-Butane	0.140819 *	0.140819
n-Butane	0.109423 *	0.109423
i-Pentane	0.115111 *	0.115111
n-Pentane	0.0572534 *	0.0572534
C6Alkanes(dibranched)	0.141758 *	0.141758

* User Specified Values
 ? Extrapolated or Approximate Values

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Process Streams Report
Stream: Flashing Losses
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	Modified: 10:13 AM, 11/30/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 9:53 AM, 11/30/2017

Mass Flow	Total ton/yr	Vapor ton/yr			
n-Heptane	0.155484 *	0.155484			
n-Octane	0.0492219 *	0.0492219			
n-Nonane	0.0247361 *	0.0247361			
Benzene	0.0617945 *	0.0617945			
Toluene	0.0604151 *	0.0604151			
Ethylbenzene	0.00325449 *	0.00325449			
p-Xylene	0.0282646 *	0.0282646			
n-Hexane	0.0513411 *	0.0513411			
2,2,4-Trimethylpentane	0.00597169 *	0.00597169			
C10+	1.75553E-06 *	1.75553E-06			

Properties

Property	Units	Total	Vapor		
Temperature	°F	79.7838 *	79.7838		
Pressure	psig	-2.05195	-2.05195		
Mole Fraction Vapor	%	100 *	100		
Mole Fraction Light Liquid	%	0	0		
Mole Fraction Heavy Liquid	%	0	0		
Molecular Weight	lb/lbmol	25.2567	25.2567		
Mass Density	lb/ft^3	0.0553946	0.0553946		
Liquid Volumetric Flow	gpm	1.72601	1.72601		
Std Vapor Volumetric Flow	MMSCFD	0.00027654	0.00027654		
Std Liquid Volumetric Flow	sgpm	0.00385962	0.00385962		
Compressibility		0.995807	0.995807		
Specific Gravity		0.872045	0.872045		
API Gravity					
Enthalpy	Btu/h	-1206.69	-1206.69		
Mass Enthalpy	Btu/lb	-1573.49	-1573.49		
Mass Cp	Btu/(lb*°F)	0.447235	0.447235		
Ideal Gas CpCv Ratio		1.21422	1.21422		
Dynamic Viscosity	cP	0.0104528	0.0104528		
Kinematic Viscosity	cSt	11.7799	11.7799		
Thermal Conductivity	Btu/(h*ft*°F)	0.0165454	0.0165454		
Surface Tension	lbf/ft				
Net Ideal Gas Heating Value	Btu/ft^3	1283.2	1283.2		
Net Liquid Heating Value	Btu/lb	19202.4	19202.4		
Gross Ideal Gas Heating Value	Btu/ft^3	1407.52	1407.52		
Gross Liquid Heating Value	Btu/lb	21070.2	21070.2		

Remarks

Process Streams Report
Stream: Separator Stream
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	Modified: 1:48 PM, 11/15/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 9:53 AM, 11/30/2017

Connections

From: -- To: 500-bbl Condensate Tanks

Composition

Mole Fraction	Total %	Light Liquid %
CO2	0.156398 *	0.156398
N2	0.00489994 *	0.00489994
Methane	2.92346 *	2.92346
Ethane	0.492694 *	0.492694
Propane	0.432995 *	0.432995
i-Butane	0.441895 *	0.441895
n-Butane	0.478694 *	0.478694
i-Pentane	0.994488 *	0.994488
n-Pentane	0.659192 *	0.659192
C6Alkanes(dibranched)	2.88117 *	2.88117
n-Heptane	13.366 *	13.366
n-Octane	12.6086 *	12.6086
n-Nonane	18.0796 *	18.0796
Benzene	2.77397 *	2.77397
Toluene	8.2396 *	8.2396
Ethylbenzene	1.19599 *	1.19599
p-Xylene	10.7685 *	10.7685
n-Hexane	1.66868 *	1.66868
2,2,4-Trimethylpentane	0.433995 *	0.433995
C10+	21.3991 *	21.3991

Mass Fraction	Total %	Light Liquid %
CO2	0.0503574 *	0.0503574
N2	0.00100425 *	0.00100425
Methane	0.343127 *	0.343127
Ethane	0.108388 *	0.108388
Propane	0.139689 *	0.139689
i-Butane	0.187908 *	0.187908
n-Butane	0.203557 *	0.203557
i-Pentane	0.524945 *	0.524945
n-Pentane	0.347958 *	0.347958
C6Alkanes(dibranched)	1.81651 *	1.81651
n-Heptane	9.79861 *	9.79861
n-Octane	10.5373 *	10.5373
n-Nonane	16.9648 *	16.9648
Benzene	1.58527 *	1.58527
Toluene	5.55434 *	5.55434
Ethylbenzene	0.928951 *	0.928951
p-Xylene	8.36413 *	8.36413
n-Hexane	1.05206 *	1.05206
2,2,4-Trimethylpentane	0.362698 *	0.362698
C10+	41.1284 *	41.1284

Mass Flow	Total lb/h	Light Liquid lb/h
CO2	0.0585476 *	0.0585476
N2	0.00116758 *	0.00116758
Methane	0.398933 *	0.398933
Ethane	0.126017 *	0.126017
Propane	0.162409 *	0.162409
i-Butane	0.21847 *	0.21847
n-Butane	0.236664 *	0.236664
i-Pentane	0.610323 *	0.610323
n-Pentane	0.40455 *	0.40455
C6Alkanes(dibranched)	2.11195 *	2.11195

* User Specified Values
 ? Extrapolated or Approximate Values

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Process Streams Report
Stream: Separator Stream
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	Modified: 1:48 PM, 11/15/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 9:53 AM, 11/30/2017

Mass Flow	Total lb/h	Light Liquid lb/h			
n-Heptane	11.3923 *	11.3923			
n-Octane	12.2511 *	12.2511			
n-Nonane	19.724 *	19.724			
Benzene	1.8431 *	1.8431			
Toluene	6.45771 *	6.45771			
Ethylbenzene	1.08004 *	1.08004			
p-Xylene	9.72449 *	9.72449			
n-Hexane	1.22317 *	1.22317			
2,2,4-Trimethylpentane	0.421687 *	0.421687			
C10+	47.8176 *	47.8176			

Properties

Property	Units	Total	Light Liquid		
Temperature	°F	66 *	66		
Pressure	psig	120 *	120		
Mole Fraction Vapor	%	0	0		
Mole Fraction Light Liquid	%	100	100		
Mole Fraction Heavy Liquid	%	0	0		
Molecular Weight	lb/lbmol	136.683	136.683		
Mass Density	lb/ft^3	49.4418	49.4418		
Liquid Volumetric Flow	gpm	0.293179	0.293179		
Std Vapor Volumetric Flow	MMSCFD	0.00774704	0.00774704		
Std Liquid Volumetric Flow	bbl/d	10.117	10.117		
Compressibility		0.0660082	0.0660082		
Specific Gravity		0.79273	0.79273		
API Gravity		46.3834	46.3834		
Enthalpy	Btu/h	-85373.3	-85373.3		
Mass Enthalpy	Btu/lb	-734.305	-734.305		
Mass Cp	Btu/(lb*°F)	0.45601	0.45601		
Ideal Gas CpCv Ratio		1.04339	1.04339		
Dynamic Viscosity	cP	0.973195	0.973195		
Kinematic Viscosity	cSt	1.22881	1.22881		
Thermal Conductivity	Btu/(h*ft*°F)	0.073705	0.073705		
Surface Tension	lbf/ft	0.00181419	0.00181419		
Net Ideal Gas Heating Value	Btu/ft^3	6702.37	6702.37		
Net Liquid Heating Value	Btu/lb	18450.5	18450.5		
Gross Ideal Gas Heating Value	Btu/ft^3	7156.55	7156.55		
Gross Liquid Heating Value	Btu/lb	19711.5	19711.5		

Remarks

Process Streams Report
Stream: Working & Breathing Losses
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	Modified: 10:13 AM, 11/30/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 9:53 AM, 11/30/2017

Connections

From: -- To: --

Composition

Mole Fraction	Total %	Vapor %			
CO2	5.83928 *	5.83928			
N2	0.0168257 *	0.0168257			
Methane	42.6524 *	42.6524			
Ethane	23.871 *	23.871			
Propane	8.45341 *	8.45341			
i-Butane	3.81656 *	3.81656			
n-Butane	2.968 *	2.968			
i-Pentane	2.41398 *	2.41398			
n-Pentane	1.19221 *	1.19221			
C6Alkanes(dibranched)	2.98409 *	2.98409			
n-Heptane	2.0287 *	2.0287			
n-Octane	0.566939 *	0.566939			
n-Nonane	0.241116 *	0.241116			
Benzene	0.897197 *	0.897197			
Toluene	0.771299 *	0.771299			
Ethylbenzene	0.0375779 *	0.0375779			
p-Xylene	0.302526 *	0.302526			
n-Hexane	0.874592 *	0.874592			
2,2,4-Trimethylpentane	0.0722894 *	0.0722894			
C10+	4.15747E-06 *	4.15747E-06			

Mass Fraction	Total	Vapor			
CO2	0.0733452 *	0.0733452			
N2	0.000134526 *	0.000134526			
Methane	0.19529 *	0.19529			
Ethane	0.204859 *	0.204859			
Propane	0.106388 *	0.106388			
i-Butane	0.0633112 *	0.0633112			
n-Butane	0.0492347 *	0.0492347			
i-Pentane	0.0497083 *	0.0497083			
n-Pentane	0.0245498 *	0.0245498			
C6Alkanes(dibranched)	0.0733941 *	0.0733941			
n-Heptane	0.0580176 *	0.0580176			
n-Octane	0.0184832 *	0.0184832			
n-Nonane	0.00882604 *	0.00882604			
Benzene	0.0200019 *	0.0200019			
Toluene	0.0202829 *	0.0202829			
Ethylbenzene	0.00113862 *	0.00113862			
p-Xylene	0.00916665 *	0.00916665			
n-Hexane	0.0215107 *	0.0215107			
2,2,4-Trimethylpentane	0.00235676 *	0.00235676			
C10+	3.11713E-07 *	3.11713E-07			

Mass Flow	Total ton/yr	Vapor ton/yr			
CO2	0.0968466 *	0.0968466			
N2	0.000177631 *	0.000177631			
Methane	0.257866 *	0.257866			
Ethane	0.270501 *	0.270501			
Propane	0.140477 *	0.140477			
i-Butane	0.0835975 *	0.0835975			
n-Butane	0.0650106 *	0.0650106			
i-Pentane	0.065636 *	0.065636			
n-Pentane	0.0324161 *	0.0324161			
C6Alkanes(dibranched)	0.0969112 *	0.0969112			

* User Specified Values
 ? Extrapolated or Approximate Values

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Process Streams Report
Stream: Working & Breathing Losses
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	Modified: 10:13 AM, 11/30/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 9:53 AM, 11/30/2017

Mass Flow	Total ton/yr	Vapor ton/yr			
n-Heptane	0.0766077 *	0.0766077			
n-Octane	0.0244056 *	0.0244056			
n-Nonane	0.0116541 *	0.0116541			
Benzene	0.0264109 *	0.0264109			
Toluene	0.026782 *	0.026782			
Ethylbenzene	0.00150346 *	0.00150346			
p-Xylene	0.0121039 *	0.0121039			
n-Hexane	0.0284032 *	0.0284032			
2,2,4-Trimethylpentane	0.00311192 *	0.00311192			
C10+	4.11593E-07 *	4.11593E-07			

Properties

Property	Units	Total	Vapor		
Temperature	°F	79.7838 *	79.7838		
Pressure	psig	-6.38015	-6.38015		
Mole Fraction Vapor	%	100 *	100		
Mole Fraction Light Liquid	%	0	0		
Mole Fraction Heavy Liquid	%	0	0		
Molecular Weight	lb/lbmol	35.0376	35.0376		
Mass Density	lb/ft^3	0.0505947	0.0505947		
Liquid Volumetric Flow	gpm	0.742872	0.742872		
Std Vapor Volumetric Flow	MMSCFD	7.83627E-05	7.83627E-05		
Std Liquid Volumetric Flow	sgpm	0.00130628	0.00130628		
Compressibility		0.994753	0.994753		
Specific Gravity		1.20975	1.20975		
API Gravity					
Enthalpy	Btu/h	-404.095	-404.095		
Mass Enthalpy	Btu/lb	-1340.43	-1340.43		
Mass Cp	Btu/(lb*°F)	0.408931	0.408931		
Ideal Gas CpCv Ratio		1.16149	1.16149		
Dynamic Viscosity	cP	0.00959487	0.00959487		
Kinematic Viscosity	cSt	11.8389	11.8389		
Thermal Conductivity	Btu/(h*ft*°F)	0.0135491	0.0135491		
Surface Tension	lbf/ft				
Net Ideal Gas Heating Value	Btu/ft^3	1715.19	1715.19		
Net Liquid Heating Value	Btu/lb	18457.2	18457.2		
Gross Ideal Gas Heating Value	Btu/ft^3	1868.65	1868.65		
Gross Liquid Heating Value	Btu/lb	20119.2	20119.2		

Remarks

* User Specified Values
 ? Extrapolated or Approximate Values

Single Oil Report C10+

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	

Properties

Volume Average Boiling Point	623.93 °F	Low Temperature Viscosity	6.3769 cP
* Molecular Weight	262.7 lb/lbmol	Temperature of High T Viscosity	210 °F
* Specific Gravity	0.88	High Temperature Viscosity	1.67316 cP
API Gravity	29.2955	Watson K	11.6719
Critical Temperature	945.693 °F	ASTM D86 10-90% Slope	0 °F/%
Critical Pressure	217.894 psig	ASTM D93 Flash Point	312.312 °F
Critical Volume	14.6687 ft ³ /lbmol	Pour Point	31.9463 °F
Acentric Factor	0.768727	Paraffinic Fraction	57.7612 %
Carbon to Hydrogen Ratio	6.69182	Naphthenic Fraction	29.2164 %
Refractive Index	1.48805	Aromatic Fraction	13.0224 %
Temperature of Low T Viscosity	100 °F	Ideal Gas Heat Capacity	88.7622 Btu/(lbmol*°F)

Remarks

* User Specified Values
? Extrapolated or Approximate Values

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ED_004016P_00012965-00107

User Value Sets Report

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	

TK-310, TK-320

User Value [ShellLength]

* Parameter	20 ft	Upper Bound	ft
* Lower Bound	0 ft	* Enforce Bounds	False

User Value [ShellDiam]

* Parameter	13.5 ft	Upper Bound	ft
* Lower Bound	0 ft	* Enforce Bounds	False

User Value [BreatherVP]

* Parameter	0.03 psig	Upper Bound	psig
Lower Bound	psig	* Enforce Bounds	False

User Value [BreatherVacP]

* Parameter	-0.03 psig	Upper Bound	psig
Lower Bound	psig	* Enforce Bounds	False

User Value [DomeRadius]

Parameter	ft	Upper Bound	ft
Lower Bound	ft	* Enforce Bounds	False

User Value [OpPress]

* Parameter	0 psig	Upper Bound	psig
Lower Bound	psig	* Enforce Bounds	False

User Value [AvgPercentLiq]

* Parameter	50 %	Upper Bound	%
Lower Bound	%	* Enforce Bounds	False

User Value [MaxPercentLiq]

* Parameter	90 %	Upper Bound	%
Lower Bound	%	* Enforce Bounds	False

User Value [AnnNetTP]

* Parameter	9.95581 bbl/day	Upper Bound	bbl/day
* Lower Bound	0 bbl/day	* Enforce Bounds	False

User Value [OREff]

* Parameter	60 %	Upper Bound	%
Lower Bound	%	* Enforce Bounds	False

User Value [MaxAvgT]

* Parameter	64 °F	Upper Bound	°F
Lower Bound	°F	* Enforce Bounds	False

User Value [MinAvgT]

* Parameter	39.3 °F	Upper Bound	°F
Lower Bound	°F	* Enforce Bounds	False

User Value [BulkLiqT]

* Parameter	55.99 °F	Upper Bound	°F
Lower Bound	°F	* Enforce Bounds	False

User Value [AvgP]

* Parameter	12.644 psia	Upper Bound	psia
Lower Bound	psia	* Enforce Bounds	False

* User Specified Values
 ? Extrapolated or Approximate Values

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User Value Sets Report

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	

User Value [ThermI]

* Parameter	1603 Btu/ft^2/day	Upper Bound	Btu/ft^2/day
Lower Bound	Btu/ft^2/day	* Enforce Bounds	False

User Value [AvgWindSpeed]

* Parameter	8.9 mi/h	Upper Bound	mi/h
Lower Bound	mi/h	* Enforce Bounds	False

User Value [MaxHourlyLoadingRate]

* Parameter	0.414825 bbl/hr	Upper Bound	bbl/hr
* Lower Bound	0 bbl/hr	* Enforce Bounds	False

User Value [EntrainedOilFrac]

* Parameter	1 %	Upper Bound	%
Lower Bound	%	* Enforce Bounds	False

User Value [TurnoverRate]

* Parameter	3.95897	Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [LLossSatFactor]

* Parameter	1	Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [AtmPressure]

* Parameter	12.644 psia	Upper Bound	psia
Lower Bound	psia	* Enforce Bounds	False

User Value [TVP]

* Parameter	4.33807 psia	Upper Bound	psia
Lower Bound	psia	* Enforce Bounds	False

User Value [AvgLiqSurfaceT]

* Parameter	65.3511 °F	Upper Bound	°F
Lower Bound	°F	* Enforce Bounds	False

User Value [MaxLiqSurfaceT]

* Parameter	79.7838 °F	Upper Bound	°F
Lower Bound	°F	* Enforce Bounds	False

User Value [TotalLosses]

* Parameter	1.32042 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.138374 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.521837 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [RimSealLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
-------------	----------	-------------	--------

* User Specified Values
 ? Extrapolated or Approximate Values

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User Value Sets Report

Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	

User Value [RimSealLosses]

Lower Bound	ton/yr	* Enforce Bounds	False
-------------	--------	------------------	-------

User Value [WithdrawalLoss]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [LoadingLosses]

* Parameter	0.110341 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [MaxHourlyLoadingLoss]

* Parameter	0.0251919 lb/hr	Upper Bound	lb/hr
Lower Bound	lb/hr	* Enforce Bounds	False

User Value [PStar]

Parameter	Upper Bound	
Lower Bound	* Enforce Bounds	False

User Value [DeckFittingLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [DeckSeamLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [FlashingLosses]

* Parameter	3.35896 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [TotalResidual]

* Parameter	504.758 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0351115 kg/mol	Upper Bound	kg/mol
Lower Bound	kg/mol	* Enforce Bounds	False

User Value [VapReportableFrac]

* Parameter	52.6371 %	Upper Bound	%
Lower Bound	%	* Enforce Bounds	False

User Value [LiqReportableFrac]

* Parameter	99.916 %	Upper Bound	%
Lower Bound	%	* Enforce Bounds	False

User Value [FlashReportableFrac]

* Parameter	36.4103 %	Upper Bound	%
Lower Bound	%	* Enforce Bounds	False

User Value [BlockReady]

* Parameter	1	Upper Bound	
Lower Bound		* Enforce Bounds	False

* User Specified Values
? Extrapolated or Approximate Values

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ED_004016P_00012965-00110

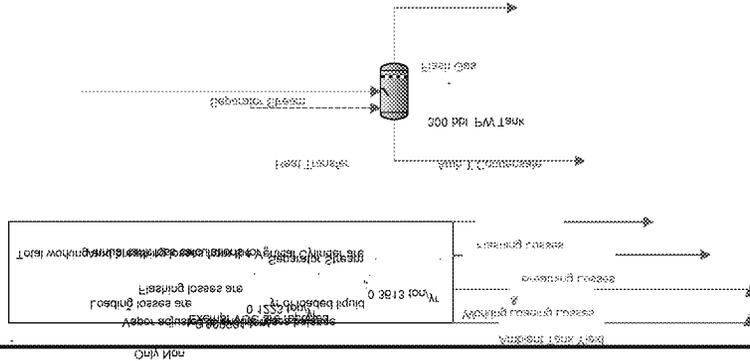
User Value Sets Report		
Client Name:	Andeavor Field Services LLC	Job: 500-bbl Condensate Tanks
Location:	Flat Rock Compressor Station	
Remarks		
This User Value Set was programmatically generated. GUID={EF2960FD-C5E3-45E5-AB01-D4D21CB802C7}		

Tank Losses at Ambient Temp Plant Schematic

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	
Flowsheet:	Tank Losses at Ambient Temp	

Flat Rock Compressor Station Produced Water Tank Emissions

Names	Units	Separator Stream	Amb T Condensate	Ambient Tank Yield
Temperature	°F	66	64.2	79.8
Pressure	psia	134.7	13.98	1.287
Std Liquid Volumetric Flow	bbbl/d	1.012	1	0.9877



IK 330

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
Stream: Amb T Condensate
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	Modified: 12:56 PM, 11/22/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 12:59 PM, 11/22/2017

Connections

From: 300-bbl PW Tank

To: --

Composition

Mole Fraction	Total %	Light Liquid %		
CO2	0.0445992	0.0445992		
N2	0.000177845	0.000177845		
Methane	0.341718	0.341718		
Ethane	0.233089	0.233089		
Propane	0.34386	0.34386		
i-Butane	0.410676	0.410676		
n-Butane	0.460116	0.460116		
i-Pentane	1.00065	1.00065		
n-Pentane	0.668146	0.668146		
C6Alkanes(dibranched)	2.95206	2.95206		
n-Heptane	13.7974	13.7974		
n-Octane	13.0314	13.0314		
n-Nonane	18.692	18.692		
Benzene	2.85581	2.85581		
Toluene	8.5101	8.5101		
Ethylbenzene	1.23623	1.23623		
p-Xylene	11.131	11.131		
n-Hexane	1.71602	1.71602		
2,2,4-Trimethylpentane	0.447963	0.447963		
C10+	22.127	22.127		

Mass Fraction	Total %	Light Liquid %		
CO2	0.0139647	0.0139647		
N2	3.54457E-05	3.54457E-05		
Methane	0.0390028	0.0390028		
Ethane	0.0498653	0.0498653		
Propane	0.107878	0.107878		
i-Butane	0.169823	0.169823		
n-Butane	0.190268	0.190268		
i-Pentane	0.51365	0.51365		
n-Pentane	0.342971	0.342971		
C6Alkanes(dibranched)	1.80994	1.80994		
n-Heptane	9.83628	9.83628		
n-Octane	10.5907	10.5907		
n-Nonane	17.0563	17.0563		
Benzene	1.5871	1.5871		
Toluene	5.57869	5.57869		
Ethylbenzene	0.933766	0.933766		
p-Xylene	8.40758	8.40758		
n-Hexane	1.05211	1.05211		
2,2,4-Trimethylpentane	0.36406	0.36406		
C10+	41.356	41.356		

Mass Flow	Total lb/h	Light Liquid lb/h		
CO2	0.00161465	0.00161465		
N2	4.09839E-06	4.09839E-06		
Methane	0.00450967	0.00450967		
Ethane	0.00576564	0.00576564		
Propane	0.0124734	0.0124734		
i-Butane	0.0196357	0.0196357		
n-Butane	0.0219996	0.0219996		
i-Pentane	0.0593904	0.0593904		
n-Pentane	0.0396557	0.0396557		
C6Alkanes(dibranched)	0.209273	0.209273		

* User Specified Values
 ? Extrapolated or Approximate Values

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ED_004016P_00012965-00113

Process Streams Report
Stream: Amb T Condensate
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	Modified: 12:56 PM, 11/22/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 12:59 PM, 11/22/2017

Mass Flow	Total lb/h	Light Liquid lb/h			
n-Heptane	1.13731	1.13731			
n-Octane	1.22454	1.22454			
n-Nonane	1.97213	1.97213			
Benzene	0.183507	0.183507			
Toluene	0.645032	0.645032			
Ethylbenzene	0.107966	0.107966			
p-Xylene	0.972121	0.972121			
n-Hexane	0.12165	0.12165			
2,2,4-Trimethylpentane	0.0420942	0.0420942			
C10+	4.78176	4.78176			

Properties

Property	Units	Total	Light Liquid		
Temperature	°F	64.2	64.2		
Pressure	psia	13.98	13.98		
Mole Fraction Vapor	%	0	0		
Mole Fraction Light Liquid	%	100	100		
Mole Fraction Heavy Liquid	%	0	0		
Molecular Weight	lb/lbmol	140.554	140.554		
Mass Density	lb/ft ³	49.6091	49.6091		
Molar Flow	lbmol/h	0.0822632	0.0822632		
Mass Flow	lb/h	11.5624	11.5624		
Vapor Volumetric Flow	ft ³ /h	0.233071	0.233071		
Liquid Volumetric Flow	gpm	0.0290582	0.0290582		
Std Vapor Volumetric Flow	MMSCFD	0.000749222	0.000749222		
Std Liquid Volumetric Flow	bbl/d	1 *	1		
Compressibility		0.00704535	0.00704535		
Specific Gravity		0.795412	0.795412		
API Gravity		45.9738	45.9738		
Enthalpy	Btu/h	-8432.91	-8432.91		
Mass Enthalpy	Btu/lb	-729.337	-729.337		
Mass Cp	Btu/(lb*°F)	0.453871	0.453871		
Ideal Gas CpCv Ratio		1.04235	1.04235		
Dynamic Viscosity	cP	1.05728	1.05728		
Kinematic Viscosity	cSt	1.33048	1.33048		
Thermal Conductivity	Btu/(h*ft*°F)	0.0740256	0.0740256		
Surface Tension	lbf/ft	0.00185374 ?	0.00185374 ?		
Net Ideal Gas Heating Value	Btu/ft ³	6890.69	6890.69		
Net Liquid Heating Value	Btu/lb	18445.9	18445.9		
Gross Ideal Gas Heating Value	Btu/ft ³	7356.35	7356.35		
Gross Liquid Heating Value	Btu/lb	19703.2	19703.2		

Remarks

* User Specified Values
 ? Extrapolated or Approximate Values

Process Streams Report
Stream: Flash Gas
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	Modified: 2:02 PM, 12/29/2015
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 12:59 PM, 11/22/2017

Connections

From: 300-bbl PW Tank

To: --

Composition

Mole Fraction	Total %	Vapor %		
CO2	3.44339	3.44339		
N2	0.143734	0.143734		
Methane	78.8291	78.8291		
Ethane	8.12531	8.12531		
Propane	3.05363	3.05363		
i-Butane	1.35975	1.35975		
n-Butane	1.02491	1.02491		
i-Pentane	0.813337	0.813337		
n-Pentane	0.395935	0.395935		
C6Alkanes(dibranched)	0.796896	0.796896		
n-Heptane	0.682593	0.682593		
n-Octane	0.178605	0.178605		
n-Nonane	0.0753169	0.0753169		
Benzene	0.367637	0.367637		
Toluene	0.286622	0.286622		
Ethylbenzene	0.0126696	0.0126696		
p-Xylene	0.110451	0.110451		
n-Hexane	0.276786	0.276786		
2,2,4-Trimethylpentane	0.0233088	0.0233088		
C10+	1.59882E-06	1.59882E-06		

Mass Fraction	Total %	Vapor %		
CO2	6.62667	6.62667		
N2	0.176071	0.176071		
Methane	55.2994	55.2994		
Ethane	10.6837	10.6837		
Propane	5.88809	5.88809		
i-Butane	3.45593	3.45593		
n-Butane	2.60489	2.60489		
i-Pentane	2.56604	2.56604		
n-Pentane	1.24915	1.24915		
C6Alkanes(dibranched)	3.00295	3.00295		
n-Heptane	2.9909	2.9909		
n-Octane	0.892139	0.892139		
n-Nonane	0.422406	0.422406		
Benzene	1.25574	1.25574		
Toluene	1.15482	1.15482		
Ethylbenzene	0.0588177	0.0588177		
p-Xylene	0.512762	0.512762		
n-Hexane	1.04301	1.04301		
2,2,4-Trimethylpentane	0.116428	0.116428		
C10+	1.83664E-05	1.83664E-05		

Mass Flow	Total ton/yr	Vapor ton/yr		
CO2	0.0185717	0.0185717		
N2	0.000493451	0.000493451		
Methane	0.15498	0.15498		
Ethane	0.0299418	0.0299418		
Propane	0.0165018	0.0165018		
i-Butane	0.00968548	0.00968548		
n-Butane	0.00730039	0.00730039		
i-Pentane	0.00719149	0.00719149		
n-Pentane	0.00350084	0.00350084		
C6Alkanes(dibranched)	0.00841596	0.00841596		

* User Specified Values
 ? Extrapolated or Approximate Values

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ED_004016P_00012965-00115

Process Streams Report
Stream: Flash Gas
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	Modified: 2:02 PM, 12/29/2015
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 12:59 PM, 11/22/2017

Mass Flow	Total ton/yr	Vapor ton/yr			
n-Heptane	0.00838219	0.00838219			
n-Octane	0.00250028	0.00250028			
n-Nonane	0.00118382	0.00118382			
Benzene	0.00351929	0.00351929			
Toluene	0.00323646	0.00323646			
Ethylbenzene	0.000164841	0.000164841			
p-Xylene	0.00143705	0.00143705			
n-Hexane	0.00292311	0.00292311			
2,2,4-Trimethylpentane	0.000326298	0.000326298			
C10+	5.14731E-08	5.14731E-08			

Properties

Property	Units	Total	Vapor		
Temperature	°F	64.2 *	64.2		
Pressure	psia	13.98 *	13.98		
Mole Fraction Vapor	%	100	100		
Mole Fraction Light Liquid	%	0	0		
Mole Fraction Heavy Liquid	%	0	0		
Molecular Weight	lb/lbmol	22.8685	22.8685		
Mass Density	lb/ft^3	0.057105	0.057105		
Molar Flow	lbmol/h	0.00279798	0.00279798		
Mass Flow	lb/h	0.0639856	0.0639856		
Vapor Volumetric Flow	ft^3/h	1.12049	1.12049		
Liquid Volumetric Flow	gpm	0.139697	0.139697		
Std Vapor Volumetric Flow	MMSCFD	2.5483E-05	2.5483E-05		
Std Liquid Volumetric Flow	sgpm	0.000341355	0.000341355		
Compressibility		0.995825	0.995825		
Specific Gravity		0.789586	0.789586		
API Gravity					
Enthalpy	Btu/h	-109.411	-109.411		
Mass Enthalpy	Btu/lb	-1709.93	-1709.93		
Mass Cp	Btu/(lb*°F)	0.452694	0.452694		
Ideal Gas CpCv Ratio		1.23849	1.23849		
Dynamic Viscosity	cP	0.0104353	0.0104353		
Kinematic Viscosity	cSt	11.408	11.408		
Thermal Conductivity	Btu/(h*ft*°F)	0.0165505	0.0165505		
Surface Tension	lbf/ft				
Net Ideal Gas Heating Value	Btu/ft^3	1165.68	1165.68		
Net Liquid Heating Value	Btu/lb	19279.2	19279.2		
Gross Ideal Gas Heating Value	Btu/ft^3	1282.28	1282.28		
Gross Liquid Heating Value	Btu/lb	21214.1	21214.1		

Remarks

* User Specified Values
 ? Extrapolated or Approximate Values

Process Streams Report
Stream: Flashing Losses
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	Modified: 11:00 AM, 11/30/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 12:59 PM, 11/22/2017

Connections

From: -- To: --

Composition

Mole Fraction	Total %	Vapor %
CO2	3.41576 *	3.41576
N2	0.133302 *	0.133302
Methane	74.4666 *	74.4666
Ethane	8.55953 *	8.55953
Propane	3.72003 *	3.72003
i-Butane	1.82176 *	1.82176
n-Butane	1.41559 *	1.41559
i-Pentane	1.19966 *	1.19966
n-Pentane	0.596683 *	0.596683
C6Alkanes(dibranched)	1.23691 *	1.23691
n-Heptane	1.16676 *	1.16676
n-Octane	0.324008 *	0.324008
n-Nonane	0.14502 *	0.14502
Benzene	0.594847 *	0.594847
Toluene	0.493034 *	0.493034
Ethylbenzene	0.0230502 *	0.0230502
p-Xylene	0.200186 *	0.200186
n-Hexane	0.447975 *	0.447975
2,2,4-Trimethylpentane	0.0393092 *	0.0393092
C10+	5.02481E-06 *	5.02481E-06

Mass Fraction	Total %	Vapor %
CO2	5.95192 *	5.95192
N2	0.147852 *	0.147852
Methane	47.2995 *	47.2995
Ethane	10.1904 *	10.1904
Propane	6.4948 *	6.4948
i-Butane	4.19234 *	4.19234
n-Butane	3.25765 *	3.25765
i-Pentane	3.42698 *	3.42698
n-Pentane	1.7045 *	1.7045
C6Alkanes(dibranched)	4.22031 *	4.22031
n-Heptane	4.62893 *	4.62893
n-Octane	1.46539 *	1.46539
n-Nonane	0.736422 *	0.736422
Benzene	1.83969 *	1.83969
Toluene	1.79863 *	1.79863
Ethylbenzene	0.09689 *	0.09689
p-Xylene	0.84147 *	0.84147
n-Hexane	1.52848 *	1.52848
2,2,4-Trimethylpentane	0.177784 *	0.177784
C10+	5.22642E-05 *	5.22642E-05

Mass Flow	Total ton/yr	Vapor ton/yr
CO2	0.0199922 *	0.0199922
N2	0.000496628 *	0.000496628
Methane	0.158877 *	0.158877
Ethane	0.0342293 *	0.0342293
Propane	0.0218157 *	0.0218157
i-Butane	0.0140819 *	0.0140819
n-Butane	0.0109423 *	0.0109423
i-Pentane	0.0115111 *	0.0115111
n-Pentane	0.00572534 *	0.00572534
C6Alkanes(dibranched)	0.0141758 *	0.0141758

* User Specified Values
 ? Extrapolated or Approximate Values

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ED_004016P_00012965-00117

Process Streams Report
Stream: Flashing Losses
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	Modified: 11:00 AM, 11/30/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 12:59 PM, 11/22/2017

Mass Flow	Total ton/yr	Vapor ton/yr			
n-Heptane	0.0155484 *	0.0155484			
n-Octane	0.00492219 *	0.00492219			
n-Nonane	0.00247361 *	0.00247361			
Benzene	0.00617945 *	0.00617945			
Toluene	0.00604151 *	0.00604151			
Ethylbenzene	0.000325449 *	0.000325449			
p-Xylene	0.00282646 *	0.00282646			
n-Hexane	0.00513411 *	0.00513411			
2,2,4-Trimethylpentane	0.000597169 *	0.000597169			
C10+	1.75553E-07 *	1.75553E-07			

Properties

Property	Units	Total	Vapor		
Temperature	°F	79.7838 *	79.7838		
Pressure	psig	-2.05195	-2.05195		
Mole Fraction Vapor	%	100 *	100		
Mole Fraction Light Liquid	%	0	0		
Mole Fraction Heavy Liquid	%	0	0		
Molecular Weight	lb/lbmol	25.2567	25.2567		
Mass Density	lb/ft^3	0.0553946	0.0553946		
Molar Flow	lbmol/h	0.00303636	0.00303636		
Mass Flow	ton/yr	0.335896 *	0.335896		
Vapor Volumetric Flow	ft^3/h	1.3844	1.3844		
Liquid Volumetric Flow	gpm	0.172601	0.172601		
Std Vapor Volumetric Flow	MMSCFD	2.7654E-05	2.7654E-05		
Std Liquid Volumetric Flow	sgpm	0.000385962	0.000385962		
Compressibility		0.995807	0.995807		
Specific Gravity		0.872045	0.872045		
API Gravity					
Enthalpy	Btu/h	-120.669	-120.669		
Mass Enthalpy	Btu/lb	-1573.49	-1573.49		
Mass Cp	Btu/(lb*°F)	0.447235	0.447235		
Ideal Gas CpCv Ratio		1.21422	1.21422		
Dynamic Viscosity	cP	0.0104528	0.0104528		
Kinematic Viscosity	cSt	11.7799	11.7799		
Thermal Conductivity	Btu/(h*ft*°F)	0.0165454	0.0165454		
Surface Tension	lbf/ft				
Net Ideal Gas Heating Value	Btu/ft^3	1283.2	1283.2		
Net Liquid Heating Value	Btu/lb	19202.4	19202.4		
Gross Ideal Gas Heating Value	Btu/ft^3	1407.52	1407.52		
Gross Liquid Heating Value	Btu/lb	21070.2	21070.2		

Remarks

Process Streams Report
Stream: Separator Stream
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	Modified: 1:48 PM, 11/15/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 12:59 PM, 11/22/2017

Connections

From: -- To: 300-bbl PW Tank

Composition

Mole Fraction	Total %	Light Liquid %
CO2	0.156398 *	0.156398
N2	0.00489994 *	0.00489994
Methane	2.92346 *	2.92346
Ethane	0.492694 *	0.492694
Propane	0.432995 *	0.432995
i-Butane	0.441895 *	0.441895
n-Butane	0.478694 *	0.478694
i-Pentane	0.994488 *	0.994488
n-Pentane	0.659192 *	0.659192
C6Alkanes(dibranched)	2.88117 *	2.88117
n-Heptane	13.366 *	13.366
n-Octane	12.6086 *	12.6086
n-Nonane	18.0796 *	18.0796
Benzene	2.77397 *	2.77397
Toluene	8.2396 *	8.2396
Ethylbenzene	1.19599 *	1.19599
p-Xylene	10.7685 *	10.7685
n-Hexane	1.66868 *	1.66868
2,2,4-Trimethylpentane	0.433995 *	0.433995
C10+	21.3991 *	21.3991

Mass Fraction	Total %	Light Liquid %
CO2	0.0503574 *	0.0503574
N2	0.00100425 *	0.00100425
Methane	0.343127 *	0.343127
Ethane	0.108388 *	0.108388
Propane	0.139689 *	0.139689
i-Butane	0.187908 *	0.187908
n-Butane	0.203557 *	0.203557
i-Pentane	0.524945 *	0.524945
n-Pentane	0.347958 *	0.347958
C6Alkanes(dibranched)	1.81651 *	1.81651
n-Heptane	9.79861 *	9.79861
n-Octane	10.5373 *	10.5373
n-Nonane	16.9648 *	16.9648
Benzene	1.58527 *	1.58527
Toluene	5.55434 *	5.55434
Ethylbenzene	0.928951 *	0.928951
p-Xylene	8.36413 *	8.36413
n-Hexane	1.05206 *	1.05206
2,2,4-Trimethylpentane	0.362698 *	0.362698
C10+	41.1284 *	41.1284

Mass Flow	Total lb/h	Light Liquid lb/h
CO2	0.00585476 *	0.00585476
N2	0.000116758 *	0.000116758
Methane	0.0398933 *	0.0398933
Ethane	0.0126017 *	0.0126017
Propane	0.0162409 *	0.0162409
i-Butane	0.021847 *	0.021847
n-Butane	0.0236664 *	0.0236664
i-Pentane	0.0610323 *	0.0610323
n-Pentane	0.040455 *	0.040455
C6Alkanes(dibranched)	0.211195 *	0.211195

* User Specified Values
 ? Extrapolated or Approximate Values

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Process Streams Report
Stream: Separator Stream
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	Modified: 1:48 PM, 11/15/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 12:59 PM, 11/22/2017

Mass Flow	Total lb/h	Light Liquid lb/h			
n-Heptane	1.13923 *	1.13923			
n-Octane	1.22511 *	1.22511			
n-Nonane	1.9724 *	1.9724			
Benzene	0.18431 *	0.18431			
Toluene	0.645771 *	0.645771			
Ethylbenzene	0.108004 *	0.108004			
p-Xylene	0.972449 *	0.972449			
n-Hexane	0.122317 *	0.122317			
2,2,4-Trimethylpentane	0.0421687 *	0.0421687			
C10+	4.78176 *	4.78176			

Properties

Property	Units	Total	Light Liquid		
Temperature	°F	66 *	66		
Pressure	psig	120 *	120		
Mole Fraction Vapor	%	0	0		
Mole Fraction Light Liquid	%	100	100		
Mole Fraction Heavy Liquid	%	0	0		
Molecular Weight	lb/lbmol	136.683	136.683		
Mass Density	lb/ft^3	49.4418	49.4418		
Molar Flow	lbmol/h	0.0850612	0.0850612		
Mass Flow	lb/h	11.6264	11.6264		
Vapor Volumetric Flow	ft^3/h	0.235154	0.235154		
Liquid Volumetric Flow	gpm	0.0293179	0.0293179		
Std Vapor Volumetric Flow	MMSCFD	0.000774704	0.000774704		
Std Liquid Volumetric Flow	bbl/d	1.0117	1.0117		
Compressibility		0.0660082	0.0660082		
Specific Gravity		0.79273	0.79273		
API Gravity		46.3834	46.3834		
Enthalpy	Btu/h	-8537.33	-8537.33		
Mass Enthalpy	Btu/lb	-734.305	-734.305		
Mass Cp	Btu/(lb*°F)	0.45601	0.45601		
Ideal Gas CpCv Ratio		1.04339	1.04339		
Dynamic Viscosity	cP	0.973195	0.973195		
Kinematic Viscosity	cSt	1.22881	1.22881		
Thermal Conductivity	Btu/(h*ft*°F)	0.073705	0.073705		
Surface Tension	lbf/ft	0.00181419	0.00181419		
Net Ideal Gas Heating Value	Btu/ft^3	6702.37	6702.37		
Net Liquid Heating Value	Btu/lb	18450.5	18450.5		
Gross Ideal Gas Heating Value	Btu/ft^3	7156.55	7156.55		
Gross Liquid Heating Value	Btu/lb	19711.5	19711.5		

Remarks

Process Streams Report
Stream: Working & Breathing Losses
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	Modified: 11:00 AM, 11/30/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 1:01 PM, 11/22/2017

Connections

From: -- To: --

Composition

Mole Fraction	Total %	Vapor %		
CO2	1.80203 *	1.80203		
N2	0.0074007 *	0.0074007		
Methane	13.8694 *	13.8694		
Ethane	9.78438 *	9.78438		
Propane	15.6948 *	15.6948		
i-Butane	11.7166 *	11.7166		
n-Butane	9.11159 *	9.11159		
i-Pentane	7.4108 *	7.4108		
n-Pentane	3.66002 *	3.66002		
C6Alkanes(dibranched)	9.16101 *	9.16101		
n-Heptane	6.228 *	6.228		
n-Octane	1.74047 *	1.74047		
n-Nonane	0.740212 *	0.740212		
Benzene	2.75435 *	2.75435		
Toluene	2.36785 *	2.36785		
Ethylbenzene	0.115362 *	0.115362		
p-Xylene	0.92874 *	0.92874		
n-Hexane	2.68495 *	2.68495		
2,2,4-Trimethylpentane	0.221925 *	0.221925		
C10+	1.27632E-05 *	1.27632E-05		

Mass Fraction	Total	Vapor		
CO2	0.0136599 *	0.0136599		
N2	3.57091E-05 *	3.57091E-05		
Methane	0.0383238 *	0.0383238		
Ethane	0.0506749 *	0.0506749		
Propane	0.119204 *	0.119204		
i-Butane	0.117297 *	0.117297		
n-Butane	0.091217 *	0.091217		
i-Pentane	0.0920946 *	0.0920946		
n-Pentane	0.0454833 *	0.0454833		
C6Alkanes(dibranched)	0.135977 *	0.135977		
n-Heptane	0.107489 *	0.107489		
n-Octane	0.0342438 *	0.0342438		
n-Nonane	0.016352 *	0.016352		
Benzene	0.0370574 *	0.0370574		
Toluene	0.037578 *	0.037578		
Ethylbenzene	0.00210953 *	0.00210953		
p-Xylene	0.016983 *	0.016983		
n-Hexane	0.0398528 *	0.0398528		
2,2,4-Trimethylpentane	0.00436636 *	0.00436636		
C10+	5.7751E-07 *	5.7751E-07		

Mass Flow	Total ton/yr	Vapor ton/yr		
CO2	0.0055009 *	0.0055009		
N2	1.43802E-05 *	1.43802E-05		
Methane	0.0154331 *	0.0154331		
Ethane	0.0204069 *	0.0204069		
Propane	0.048004 *	0.048004		
i-Butane	0.0472357 *	0.0472357		
n-Butane	0.0367334 *	0.0367334		
i-Pentane	0.0370868 *	0.0370868		
n-Pentane	0.0183163 *	0.0183163		
C6Alkanes(dibranched)	0.0547585 *	0.0547585		

* User Specified Values
 ? Extrapolated or Approximate Values

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ED_004016P_00012965-00121

Process Streams Report
Stream: Working & Breathing Losses
 Phases Grouped by Columns

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	Modified: 11:00 AM, 11/30/2017
Flowsheet:	Tank Losses at Ambient Temp	Status: Solved 1:01 PM, 11/22/2017

Mass Flow	Total ton/yr	Vapor ton/yr			
n-Heptane	0.0432862 *	0.0432862			
n-Octane	0.0137901 *	0.0137901			
n-Nonane	0.006585 *	0.006585			
Benzene	0.0149232 *	0.0149232			
Toluene	0.0151328 *	0.0151328			
Ethylbenzene	0.000849513 *	0.000849513			
p-Xylene	0.00683913 *	0.00683913			
n-Hexane	0.0160489 *	0.0160489			
2,2,4-Trimethylpentane	0.00175835 *	0.00175835			
C10+	2.32565E-07 *	2.32565E-07			

Properties

Property	Units	Total	Vapor		
Temperature	°F	79.7838 *	79.7838		
Pressure	psig	-12.0205	-12.0205		
Mole Fraction Vapor	%	100 *	100		
Mole Fraction Light Liquid	%	0	0		
Mole Fraction Heavy Liquid	%	0	0		
Molecular Weight	lb/lbmol	58.0578	58.0578		
Mass Density	lb/ft^3	0.0269565	0.0269565		
Molar Flow	lbmol/h	0.00158362	0.00158362		
Mass Flow	ton/yr	0.402703 *	0.402703		
Vapor Volumetric Flow	ft^3/h	3.41073	3.41073		
Liquid Volumetric Flow	gpm	0.425234	0.425234		
Std Vapor Volumetric Flow	MMSCFD	1.4423E-05	1.4423E-05		
Std Liquid Volumetric Flow	sgpm	0.000314391	0.000314391		
Compressibility		0.995338	0.995338		
Specific Gravity		2.00458	2.00458		
API Gravity					
Enthalpy	Btu/h	-82.0801	-82.0801		
Mass Enthalpy	Btu/lb	-892.744	-892.744		
Mass Cp	Btu/(lb*°F)	0.390256	0.390256		
Ideal Gas CpCv Ratio		1.09624	1.09624		
Dynamic Viscosity	cP	0.00778206	0.00778206		
Kinematic Viscosity	cSt	18.0223	18.0223		
Thermal Conductivity	Btu/(h*ft*°F)	0.00992131	0.00992131		
Surface Tension	lbf/ft				
Net Ideal Gas Heating Value	Btu/ft^3	2935.43	2935.43		
Net Liquid Heating Value	Btu/lb	19036.1	19036.1		
Gross Ideal Gas Heating Value	Btu/ft^3	3172.43	3172.43		
Gross Liquid Heating Value	Btu/lb	20585.2	20585.2		

Remarks

* User Specified Values
 ? Extrapolated or Approximate Values

Single Oil Report C10+

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	

Properties

Volume Average Boiling Point	623.93 °F	Low Temperature Viscosity	6.3769 cP
* Molecular Weight	262.7 lb/lbmol	Temperature of High T Viscosity	210 °F
* Specific Gravity	0.88	High Temperature Viscosity	1.67316 cP
API Gravity	29.2955	Watson K	11.6719
Critical Temperature	945.693 °F	ASTM D86 10-90% Slope	0 °F/%
Critical Pressure	217.894 psig	ASTM D93 Flash Point	312.312 °F
Critical Volume	14.6687 ft ³ /lbmol	Pour Point	31.9463 °F
Acentric Factor	0.768727	Paraffinic Fraction	57.7612 %
Carbon to Hydrogen Ratio	6.69182	Naphthenic Fraction	29.2164 %
Refractive Index	1.48805	Aromatic Fraction	13.0224 %
Temperature of Low T Viscosity	100 °F	Ideal Gas Heat Capacity	88.7622 Btu/(lbmol*°F)

Remarks

User Value Sets Report

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	

TK-330

User Value [ShellLength]

* Parameter	15 ft	Upper Bound	ft	
* Lower Bound	0 ft	* Enforce Bounds	False	

User Value [ShellDiam]

* Parameter	12 ft	Upper Bound	ft	
* Lower Bound	0 ft	* Enforce Bounds	False	

User Value [BreatherVP]

* Parameter	0.03 psig	Upper Bound	psig	
Lower Bound	psig	* Enforce Bounds	False	

User Value [BreatherVacP]

* Parameter	-0.03 psig	Upper Bound	psig	
Lower Bound	psig	* Enforce Bounds	False	

User Value [DomeRadius]

Parameter	ft	Upper Bound	ft	
Lower Bound	ft	* Enforce Bounds	False	

User Value [OpPress]

* Parameter	0 psig	Upper Bound	psig	
Lower Bound	psig	* Enforce Bounds	False	

User Value [AvgPercentLiq]

* Parameter	50 %	Upper Bound	%	
Lower Bound	%	* Enforce Bounds	False	

User Value [MaxPercentLiq]

* Parameter	90 %	Upper Bound	%	
Lower Bound	%	* Enforce Bounds	False	

User Value [AnnNetTP]

* Parameter	0.995581 bbl/day	Upper Bound	bbl/day	
* Lower Bound	0 bbl/day	* Enforce Bounds	False	

User Value [OREff]

* Parameter	60 %	Upper Bound	%	
Lower Bound	%	* Enforce Bounds	False	

User Value [MaxAvgT]

* Parameter	64 °F	Upper Bound	°F	
Lower Bound	°F	* Enforce Bounds	False	

User Value [MinAvgT]

* Parameter	39.3 °F	Upper Bound	°F	
Lower Bound	°F	* Enforce Bounds	False	

User Value [BulkLiqT]

* Parameter	55.99 °F	Upper Bound	°F	
Lower Bound	°F	* Enforce Bounds	False	

User Value [AvgP]

* Parameter	12.644 psia	Upper Bound	psia	
Lower Bound	psia	* Enforce Bounds	False	

* User Specified Values
? Extrapolated or Approximate Values

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User Value Sets Report

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	

User Value [ThermI]

* Parameter	1603 Btu/ft^2/day	Upper Bound	Btu/ft^2/day
Lower Bound	Btu/ft^2/day	* Enforce Bounds	False

User Value [AvgWindSpeed]

* Parameter	8.9 mi/h	Upper Bound	mi/h
Lower Bound	mi/h	* Enforce Bounds	False

User Value [MaxHourlyLoadingRate]

* Parameter	0.0414825 bbl/hr	Upper Bound	bbl/hr
* Lower Bound	0 bbl/hr	* Enforce Bounds	False

User Value [EntrainedOilFrac]

* Parameter	1 %	Upper Bound	%
Lower Bound	%	* Enforce Bounds	False

User Value [TurnoverRate]

* Parameter	1.33615	Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [LLossSatFactor]

* Parameter	1	Upper Bound	
Lower Bound		* Enforce Bounds	False

User Value [AtmPressure]

* Parameter	12.644 psia	Upper Bound	psia
Lower Bound	psia	* Enforce Bounds	False

User Value [TVP]

* Parameter	4.33807 psia	Upper Bound	psia
Lower Bound	psia	* Enforce Bounds	False

User Value [AvgLiqSurfaceT]

* Parameter	65.3511 °F	Upper Bound	°F
Lower Bound	°F	* Enforce Bounds	False

User Value [MaxLiqSurfaceT]

* Parameter	79.7838 °F	Upper Bound	°F
Lower Bound	°F	* Enforce Bounds	False

User Value [TotalLosses]

* Parameter	0.402703 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.0276748 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.375029 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [RimSealLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
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* User Specified Values
? Extrapolated or Approximate Values

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ED_004016P_00012965-00125

User Value Sets Report

Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	

User Value [RimSealLosses]

Lower Bound	ton/yr	* Enforce Bounds	False
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User Value [WithdrawalLoss]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [LoadingLosses]

* Parameter	0.0110341 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [MaxHourlyLoadingLoss]

* Parameter	0.00251919 lb/hr	Upper Bound	lb/hr
Lower Bound	lb/hr	* Enforce Bounds	False

User Value [PStar]

Parameter	Upper Bound	
Lower Bound	* Enforce Bounds	False

User Value [DeckFittingLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [DeckSeamLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [FlashingLosses]

* Parameter	0.335896 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [TotalResidual]

* Parameter	50.1851 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0351115 kg/mol	Upper Bound	kg/mol
Lower Bound	kg/mol	* Enforce Bounds	False

User Value [VapReportableFrac]

* Parameter	89.7306 %	Upper Bound	%
Lower Bound	%	* Enforce Bounds	False

User Value [LiqReportableFrac]

* Parameter	99.916 %	Upper Bound	%
Lower Bound	%	* Enforce Bounds	False

User Value [FlashReportableFrac]

* Parameter	36.4103 %	Upper Bound	%
Lower Bound	%	* Enforce Bounds	False

User Value [BlockReady]

* Parameter	1	Upper Bound	
Lower Bound		* Enforce Bounds	False

* User Specified Values
? Extrapolated or Approximate Values

ProMax 4.0.16071.0
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ED_004016P_00012965-00126

User Value Sets Report		
Client Name:	Andeavor Field Services LLC	Job: 300-bbl PW Tank
Location:	Flat Rock Compressor Station	
Remarks This User Value Set was programmatically generated. GUID={EF2960FD-C5E3-45E5-AB01-D4D21CB802C7}		

Enclosed Combustor Specifications

- Dehydrator BTEX Combustor (24-inch Cimarron)
- Tank Vapor Combustor (48-inch Cimarron)

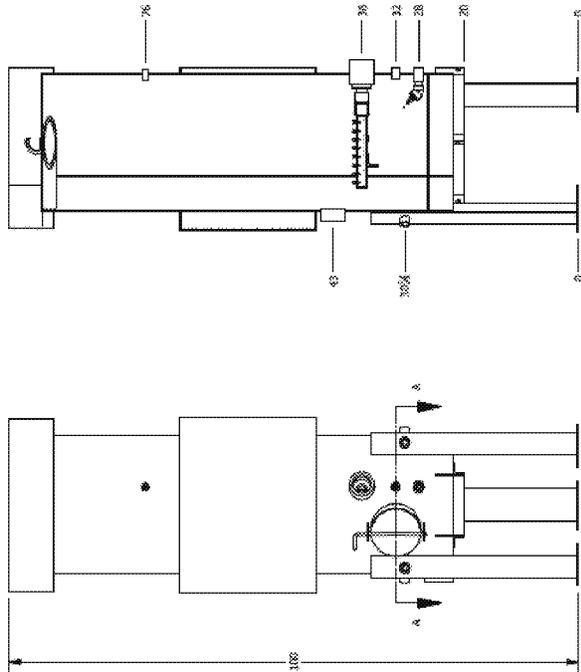
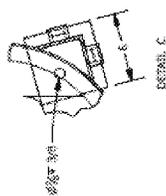
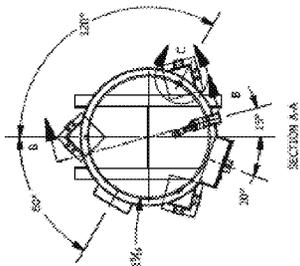


SPECIFICATIONS FOR 24" STANDARD ENCLOSED COMBUSTOR

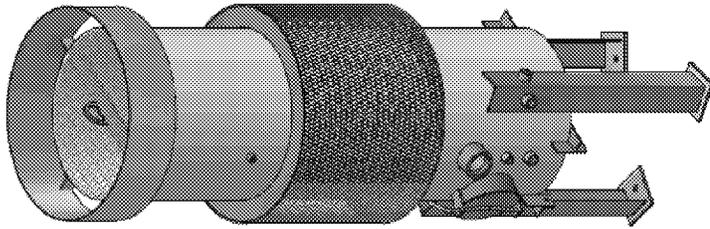
GENERAL PROPERTIES	
Description	Enclosed Combustor
Typical vapor heat content	2,300 Btu/ft ³
Ambient Temperature	-20 to 120° F
Flow Rate	Up to 9,200 SCFD
Pilot Fuel Required	At 5 to 7 PSIG pilot regulator setting, consumption of 14 to 17 SCFH
Heat Release	Up to 1.0 MMBtu/hr
Stack Temperature	500 to 1200° F
Inlet Pressure Required	1 to 16 oz/in ²
Turndown Ratio	4.5:1
VOC Destruction Efficiency	Per EPA Manufacturer's Test: >99%

MECHANICAL PROPERTIES	
Electrical Classification	General Area Classification
Elevation	Up to 5,000 ft ASL
Weight	Approx. 720 lbs (excludes concrete base)
Dimensions	24" square base by 100" height

UTILITIES	
Pilot Gas	Process Gas or propane
Solar	Solar panel with battery backup available
Operating Voltage – Cimarron ARC	10 to 30 VDC, typically 12 or 24 VDC
Solar Voltage – Cimarron ARC	40 VDC
Current Consumption – Cimarron ARC	Typically 15 mA
Solar Charging Current – Cimarron ARC	1 to 2 Amp



- ECD-2-24-64
24" DIA X 100" HEIGHT, 64 JETS
EMISSION CONTROL DEVICE
- * > 98% TVOC DRE, CERTIFIED USEPA 40 CFR 60, APPENDIX A, SOURCE EMISSIONS TEST METHODS REFERENCED. MEETS ALL EPA & CDPHE REGULATIONS.
 - * DESTROYS OIL/CONDENSATION PRODUCTION TANK VAPORS W/ NO VISIBLE FLAME.
 - * EXCELLENT OPACITY AND SMOKELESS OPERATION.
 - * RELIABLE AND CUSTOMIZABLE IGNITION.
 - * VERY LOW CAPITAL AND OPERATING COST.
 - * EASY TO OPERATE AND MAINTAIN.
 - * WILL DESTROY UP TO 8 MSCFD @ 10 oz/in²
 - * WEIGHT: 720 lbs



PN: 3500100

APPROVED FOR ASME CODE SECTION VIII DIV 1

DATE: _____ DESIGN BY: _____

CIMARRON
Energy Inc.

TITLE:
24" ECD

DATE: _____ DRAWN BY: J. PERRY, I. PERRY, INC. 3500100-1 UNIT 25

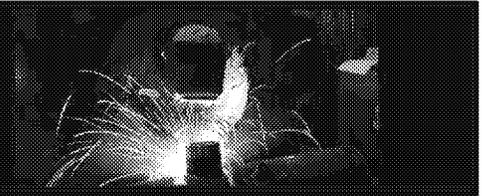
SHEET: 1 OF 1

UNLESS OTHERWISE SPECIFIED

1. REMOVE ALL BURRS AND SHARP CORNERS.
2. SURFACE FINISH: 32
3. COILS: 304L
4. ALL DIMENSIONS ARE IN INCHES.
5. FINISH: PER.
6. FABRICATION:
 - X = 8: 0.25
 - XX = 8: 0.125
 - XXX = 8: 0.063
 - XXXX = 8: 0.031
7. MACHINING:
 - X = 0.0050
 - XX = 0.0025
 - XXX = 0.00125
 - XXXX = 0.00063
8. ANGLES: 45°
9. RADIUS: 0.00125

PN: 3500100

SECTION B-B



CONTACT INFORMATION

WASTE GAS CHARACTERISTICS (IF KNOWN)

Company name:	Tesoro Logistics
Company contact name:	Samantha Spellman
Contact phone number:	760 590 8424
Contact e-mail address:	samantha.l.spellman@tsocorp.com
Project location:	Pelican Lake
Requested delivery date:	
Cimarron WO#	

Heat release required		MMBTU/hr
Net heating value		BTU/Ft ³
Gas specific gravity***	1.276	-
Max supply pressure***	8 oz	oz/in ²
Estimated max gas flowrate	15	MSCFD
Estimated normal gas flowrate***	12	MSCFD

Qty Requested	Unit	Max / Min Flowrate Range *	Heat Release*	Overall Dimensions (pad not included)	Inlet Connection	Flame Cell size**
	24" STD	9.2 / 2.0 MSCFD	.98 MMBtu/hr	24"D x 8.5'H	3" NPT	24"
	30" STD	15 / 3.12 MSCFD	1.6 MMBtu/hr	30"D x 8.5'H	3" NPT	30"
1	48" STD	30 / 4.8 MSCFD	3.2 MMBtu/hr	48"D x 12'H	3" NPT	48"
	60" STD	57.6 / 12.0 MSCFD	6.1 MMBtu/hr	60"D x 12.5'H or 16.5'H	3" NPT	60"
	48" HV	109 / 13.7 MSCFD	11.7 MMBtu/hr	48"D x 25'H	3" NPT	(4) 24"

AVAILABLE OPTIONS

ARC Burner Management and Ignition systems		ARC—basic light and relight functionality. Flexible and easy to upgrade.
		ARC Hybrid—Upgrade to the ARC system. Facilitates inlet gas shutdown in the event of a pilot failure. Requires actuator option below
	x	ARC SAU— Upgrade to the ARC system. Allows for low flow condition shutdown and allows tanks to build pressure. Std setup is 2 oz closure and 5 oz open. Ranges are adjustable and can be modified in the field. Requires actuator option below.
Standard Drip Pot		24" x 48" w/ 4" FNPT connections. Liquid capacity 90 gal
	x	20" x 36" w/ 3" FNPT connections. Liquid capacity 46 gal
		16" x 36" w/ 3" FNPT connections. 5' height. Liquid capacity 29 gal.
		16" x 36" w/ 3" FNPT connections. 7' height. Liquid capacity 29 gal.
Custom Drip Pot	x	Required size/connections/capacity _____ Add custom 2" threaded nozzle to attach level switch on end cap. at 50% level capacity.
Cimarron "Sentry" Datalogger		USB port for easy data downloads. Single analog input for pilot flame sense or thermocouple data. Two contact switch closure inputs
Actuator Package		Cimarron piston-style actuator for burner management system control. Required for Hybrid and SAU ARC systems. Ranges are adjustable and can be modified in the field.
Safety Float Check Valve option for Drip Pot		4" x 6"
		3" x 6"
Stack thermocouple	x	18" Type K thermocouple with wire
Concrete Pad	x	Standard concrete pad requested
Inline Flame arrestor		2" Wenco Flame arrestor
	x	3" Wenco Flame arrestor
Header plumbing (HV unit only)		2" header plumbing from integral drip box to burner manifold
		3" header plumbing from integral drip box to burner manifold
48" HV Color (Desert Tan standard)		

* As determined per NSPS OOOO §60.5413(d) - 2014 Manufacturers Performance testing
 ** Flame cell thickness is 4"
 *** Required fields

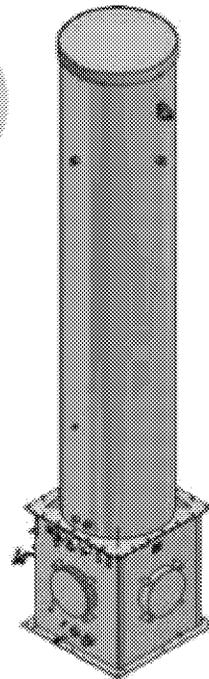


EPA CERTIFIED

ENCLOSED COMBUSTORS

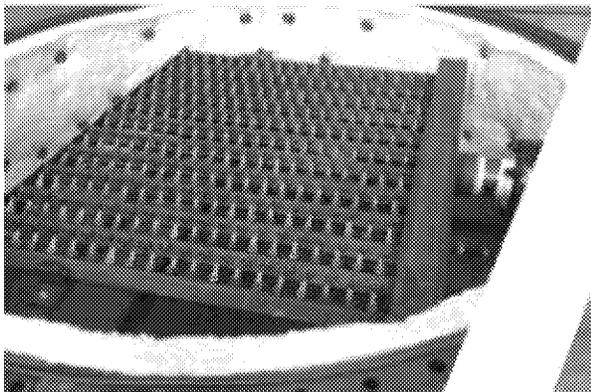


Cimarron's enclosed combustion units provide a clean, safe, and efficient solution for eliminating tank vapors and ensuring regulatory compliance. Their performance has been proven to exceed the US EPA's strict requirements with a greater than 99% destruction rate. Designed for both low and high volume applications, the enclosed flares are easy to install and require little ongoing maintenance. Ignition systems include automation capability and data logging features. Standard models have flame cells ranging from 24" to 60", with capacity of 2,000 to 75,000 SCFD. The larger high volume units contain four 24" flame cells and can accommodate up to 150,000 SCFD. ECDs typically operate at pressures of 1 to 12 psig.

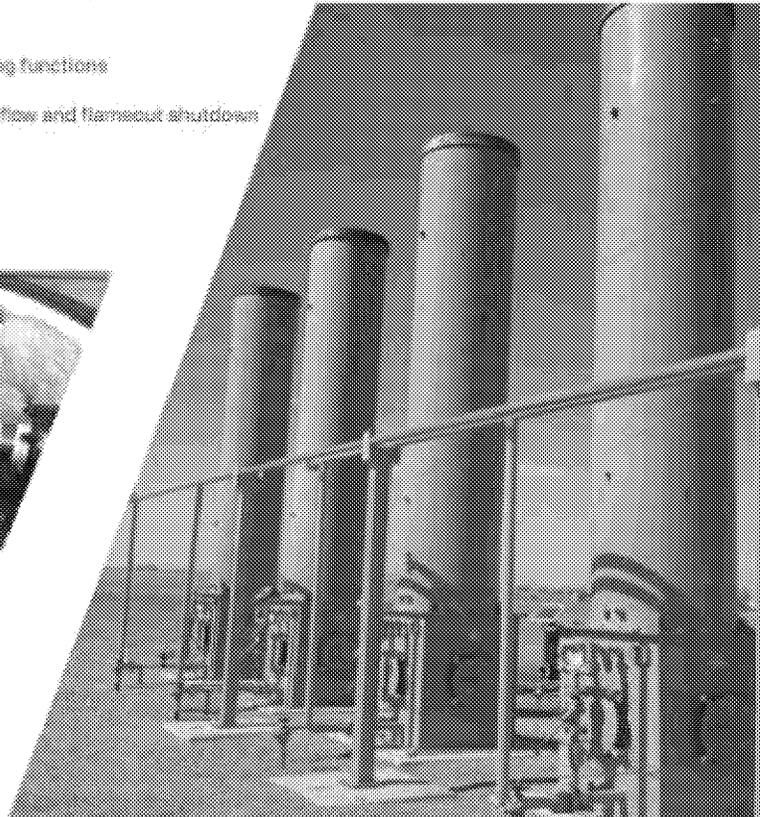


DESIGN FEATURES AND OPTIONS

- Five Models Manufacturer Performance Tested as per NSPS 40 CFR 60.643(c)
- Demonstrated VOC Destruction Efficiency >99%
- Eliminates the requirement for in-field testing to demonstrate continuous compliance.
- Solar powered EMS and data logging functions
- Cimarron actuator package for low flow and flameout shutdown
- Drip tank for free liquid removal
- User friendly and easy to install

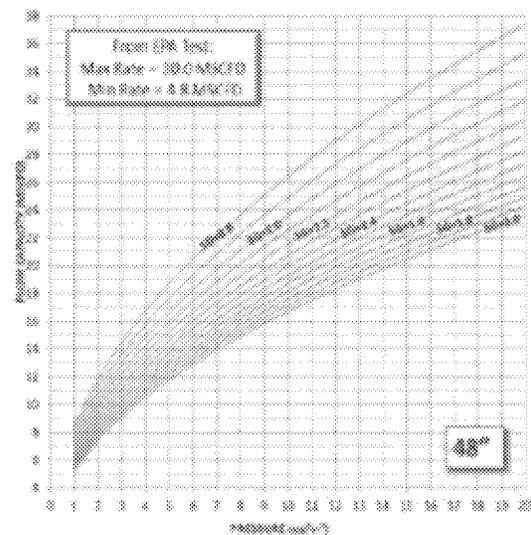
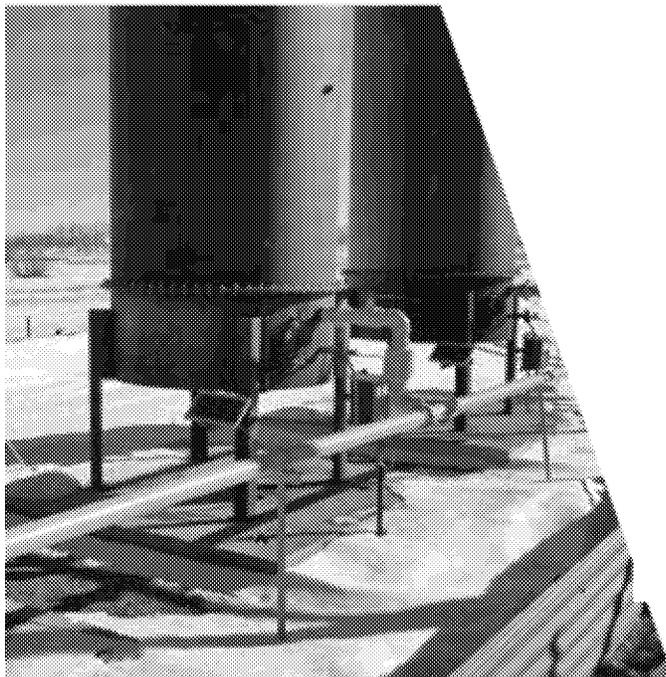
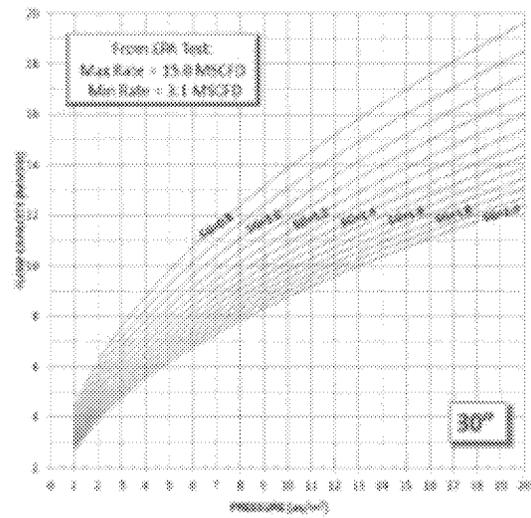
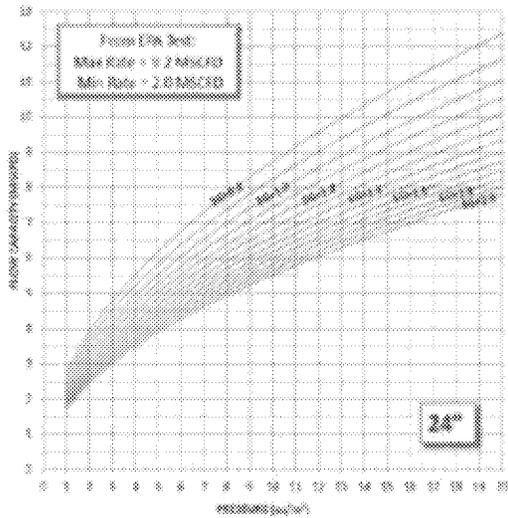


All five models were approved by the EPA in December 2014 as "Manufacturer Tested" under Quad 0 guidelines.

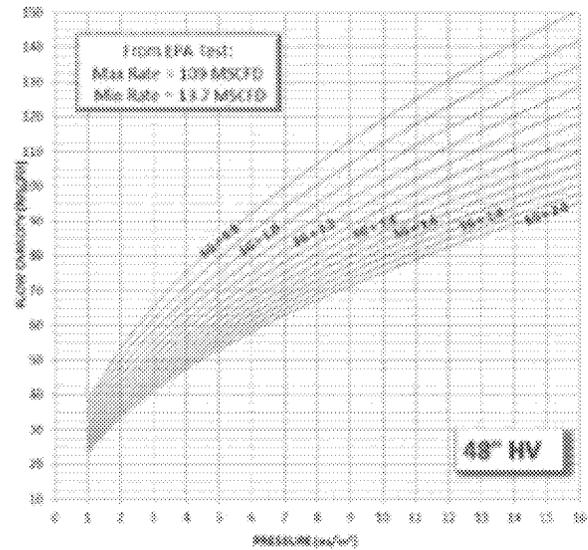
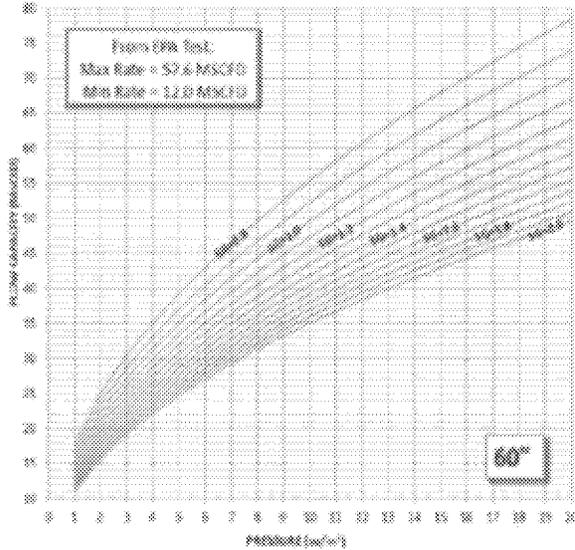




Enclosed Combustors Capacity Based on Vapor Density and Pressure



CIMARRON ENERGY



Vessel Data	24"	30"	48"	60"	48" HV
Dimensions	24"D x 8.5' s/s	30"D x 8.5' s/s	48"D x 12' s/s	60"D x 13' s/s	48"D x 25' s/s
MAWP	Atmospheric	Atmospheric	Atmospheric	Atmospheric	Atmospheric
MMBTU/HR	.98 MMBTU/HR	1.6 MMBTU/HR	3.2 MMBTU/HR	6.1 MMBTU/HR	11.7 MMBTU/HR
Jets	64 Stainless Steel Jets	88 Stainless Steel Jets	210 Stainless Steel Jets	440 Stainless Steel Jets	88 Stainless Steel Jets
Flamecell	24"	30"	48"	60"	4 (Four) x 24"
Burner	15"L x 16"W	19"L x 16"W	26"L x 27"W	34"L x 41"W	28"L x 27"W
Flame Arrestor	2" Wenco	2" Wenco	3" Wenco	3" Wenco	2" Wenco
Concrete Pad	36" x 36" x 6"	36" x 36" x 6"	72" x 72" x 6"	96" x 96" x 8"	96" x 96" x 8" w/anchors
Inlet Connection	3" NPT	3" NPT	3" NPT	3" NPT	3" NPT
Pilot Regulator	1/4" Fisher 67CR-206	1/4" Fisher 67CR-206	1/4" Fisher 67CR-206	1/4" Fisher 67CR-206	1/2" Watts